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ABSTRACT

The study investigates the adequacy of pension plans and severance pay for defense workers in the event of defense cutbacks. Pension plans were examined on the basis of a sample of firms in the defense and nondefense sectors, matched by size and industry. The study finds that benefit provisions of defense industry plans are similar to those in nondefense industry, but that the financial characteristics and experience differ significantly. This is because the defense firms employ the same funding methods and actuarial assumptions, not taking account of differences in employment history and prospects. The study finds that, overall, the pension plans and severance pay for defense workers are not well-suited to provide adjustment benefits to displaced defense workers. (Author/BC)

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PENSIONS AND SEVERANCE PAY FOR DISPLACED DEFENSE WORKERS

UNITED STATES OF AMERICA
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Prepared for

U.S. ARMS CONTROL AND DISARMAMENT AGENCY

Washington, D.C.

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PENSIONS AND SEVERANCE PAY FOR DISPLACED DEFENSE WORKERS

ACDA/E-138

Prepared for

The U.S. Arms Control and
Disarmament Agency

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This report was prepared under a contract with the United States Arms Control and Disarmament Agency. The judgments expressed in this report are those of the authors, and do not necessarily reflect the views of the United States arms Control and Disarmament Agency or of any other department or agency of the United States Government.

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Foreword

This is the latest in a series of research studies devoted to exploring the implications of reductions in defense demand on the domestic economy.

The United States Arms Control and Disarmament Agency (ACDA) is charged, as one of its responsibilities, with the pursuance of appropriate research which will assess "the economic . . . consequences of arms control and disarmament, including the problems of readjustment arising in industry and the reallocation of national resources" (P.L. - 87 - 297).

In June 1967, ACDA contracted with the University of Illinois, Champaign, Illinois for a study to ascertain whether and under what circumstances there might be justification for special policies on pensions and other related fringe benefits for defense workers. The study is not intended to provide definitive solutions to adjustment problems or to reach firm policy conclusions. The study does try to identify the significant questions and to seek definitive data on which wise policy may be based.

This publication represents the complete study submitted to the Agency in June, 1969.

Those principally responsible for the preparation of this study were Professors Hugh Folk and Paul Hartman.

Gerard C. Smith
Director

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Preface

This study was conducted for the United States Arms Control and Disarmament Agency (ACDA) under Contract ACDA/E-138. The judgments and opinions expressed in this report are those of the authors and do not necessarily reflect the views of ACDA or any other agency of the United States Government.

The study is based on a number of studies of displaced workers, especially three studies issued as publications of ACDA, which are available from the Superintendent of Documents, Government Printing Office, Washington, D.C.:

1. A Case Study of the Effects of the Dyna-Soar Contract Cancellation Upon Employees of the Boeing Company in Seattle, Washington.
2. Reemployment Experiences of Martin Company Workers Released at Denver, Colorado, 1963-64; Effects of Defense Employment Readjustments.
3. The Post Layoff Labor Market Experiences of the Former Republic Aviation Corporation (Long Island) Workers.

The authors wish to acknowledge the generous assistance of Messrs. Leslie Fishman, Curt Eaton, Byron Bunger, and Jay Allen of the University of Colorado who furnished copies of their analysis punched card decks of the three foregoing studies for use in the present study. An extensive and useful analysis of this data is presented in the ACDA publication

Reemployment Experiences of Defense Workers: A Statistical Analysis of the Boeing, Martin, and Republic Layoffs.

In addition to these studies, the authors drew on the public files of pensions and welfare plans maintained under the Welfare and Pension Plans Reporting and Disclosure Act, by the Office of Labor-Management and Welfare-Pension Reports of the U.S. Department of Labor. The staff of this agency was helpful in using these files.

Many of the corporations in the plans used in the studies furnished useful documentary material. Their cooperation is appreciated.

Mr. Henry D. Wyner, Senior Economist, Economics Bureau, ACDA, served as Project Officer for this study, and provided encouragement and support.

The study was directed by Hugh Folk and written jointly by Folk and Paul Hartman. The authors wich to thank Jerry Briller, David Depcik, and Gerald Robinson for research assistance.

SUMMARY OF FINDINGS

The following are the principal findings of this study:

(1) Employment in many defense industries is more unstable than in most non-defense industries. As a result, workers in the unstable defense industries tend to be younger than average and relatively few workers in these industries have long tenure.

(2) Because relatively few workers in defense industries are eligible for large early retirement benefits, the private pension systems of defense employers cannot be expected to provide significant financial support for many workers who might retire after being displaced from defense employment.

(3) Defense workers displaced in previous cutbacks have been somewhat more successful in reemployment than displaced nondefense workers, in part because of their lower average age.

(4) Relatively few displaced defense or non-defense workers have withdrawn from the labor force after being displaced.

(5) Vesting provisions in pension plans covering defense workers are often more liberal than in comparable non-defense firms. Even so, the proportion of displaced defense workers with vested benefits would be quite low because of the relatively short tenure of many defense workers.

(6) Large scale cutbacks in defense employment could leave pension plans with significant actuarial gains, which might benefit companies as prepaid pension expense or, under certain conditions, would revert to the firm.

(7) It is possible under the Internal Revenue Code and the Armed Service Procurement Regulation to establish administrative procedures to provide better vesting provisions for displaced defense workers and to ensure that Government funds paid to provide fringe benefits for defense workers are used to that end.

CHAPTER I

INTRODUCTION

A. Purpose and Scope of the Study

The United States Arms Control and Disarmament Agency (ACDA) is charged with the conduct of studies on the economic consequences of arms control and disarmament and, in carrying out this responsibility since its establishment in 1961, has sponsored a large number of studies dealing with problems of aggregate, manpower, and regional adjustment to changes in defense spending. The purpose of this study for ACDA is to undertake a preliminary examination of the "adequacy" of pensions, severance pay, and other fringe benefits for defense workers in the event of layoffs which would occur as the result of arms control or disarmament.

As a practical matter the potential scenarios for arms control and disarmament reductions are innumerable and a general model for projecting the consequences of all possibilities cannot be generated. Currently, the arms control measures receiving public attention are of rather limited scope in terms of reduction in defense employment--that is, limitations on the production of offensive and defensive missile systems (often referred to as the "freeze" on nuclear weapons), a full test ban, a production cutoff for fissionable materials, control of chemical and biological weapons, and restrictions on the military use of the seabed. However, there are other near-term possibilities for defense employment reductions or changes which make the matter of examination of payout for displaced defense workers more current and realistic.

Cessation of hostilities in Viet Nam presumably will entail substantial displacements in the defense sector even if the post-Viet Nam defense budget is higher than is generally anticipated, for defense output will shift away from ordnance and soft goods to hardware and R & D on more sophisticated weapons. However, layoffs in the aerospace portion of defense industry presumably will not be large, as R & D procurement of missiles, aircraft, and radar equipment tend to pick up. There are also possibilities for changes in the general level of defense spending within a few years after Viet Nam. Finally, there are the changes which occur in the location of contracts irrespective of the general level of defense spending; companies and plants often are not able to immediately replace with new orders work on contracts coming to an end or being cancelled. Thus, the underlying hypothesis of the study is that vulnerability to layoff generally is greater in the defense sector than in the non-defense sector, based on the theoretical summing of all probabilities.

To accomplish this purpose we examine: (1) the structure of the defense industry and the composition of its workforce (Chapter II); (2) pension and benefit practices in defense and non-defense firms; (3) the experiences and needs of displaced defense workers in earlier cutbacks (Chapter IV); (4) the adaptability of current benefit systems to the needs and proposed legislation which might improve adaptability (Chapter V). Finally, we identify major problems and recommend additional studies (Chapter VI).

Before beginning the substantive analysis, however, we wish in the balance of this chapter to outline the approaches to policy analysis, compensation, and arms control assumptions which we have used in the study.

B. Policy Analysis

The study is not intended to provide definitive solutions to adjustment problems or to reach firm policy conclusions. Rather we try to identify the significant questions and to seek definitive data on which wise policy may be based. Nevertheless, we believe the conclusions of the study are in the main established, and the information needed to make the conclusions definitive would not lead to important revisions in our conclusions. This belief is not based on mere faith in our conclusions but on the close concordance of the available evidence with expectations derived from economic analysis.

Policy analysis should try to identify feasible alternatives and to identify reasons favoring or opposing particular alternatives. Wise policy for a specific governmental problem should take account of the effects of the specific policy on general public objectives and of the effects of general policy on the specific problem. This is particularly true of our problem. Special aids for defense workers affected by an arms cutback may appear to be justifiable as a special government responsibility, but a cutback has indirect effects on other workers and a general policy applying to all affected workers may be more equitable.

The general national policy objectives assumed in the study are:

(1) High and rising economic output or gross national product.

(2) Maximum employment, defined as unemployment reduced to a frictional level of perhaps 3 per cent, and implying jobs available for workers willing to work and seeking work at reasonable wages.

(3) Economic freedom, implying an absence of unnecessary regulations and a high degree of free choice.

(4) Intergroup equity, implying that people in similar situations are treated equally.

The specific policy objective assumed is that displaced defense workers be compensated for the losses they incur as a result of the arms cutback and that the compensation be efficient.

C. The Compensation Principle

The principle of compensation requires that the displaced worker be placed in as desirable an "expected position" after the change as he was in before the change. "Expected position" is a probabilistic concept. It is impossible to say what a particular worker could expect if a cutback did not occur. Some workers will die, become disabled, be laid off, quit, be discharged, or be promoted. It is possible, however, to compute a present value of future lifetime earnings for a defense worker on the assumption that he will have the same earnings experience and mortality as others in the group who are older. In short, he repeats the group experience.* The present value of the worker's earnings if he remains employed in his defense job is

$$L = \sum_{t=1}^{\infty} \frac{E_t P_t}{(1 + r)^t} \qquad (1)$$

where E_t is the earnings expected in period t, P_t is the probability of the worker surviving period t, and r is the interest rate.

The displaced worker has an alternative present value which is the sum of L' (the present value of earnings he expects after displacement), Federal-State unemployment benefits (U) and vested pension rights (P) and severance pay or other adjustment benefits (S) he receives from his former employer. U, P, and S are also present values. If

$$L > L' + U + P + S \qquad (2)$$

---

*The literature on this subject is far too extensive to summarize, but the key reference is Gary Becker, Human Capital (New York: National Bureau of Economic Research, 1964.

the worker experiences a loss (D) equal to

$$D = L - (L' + U + P + S) \qquad (3)$$

It is shown below that some displaced workers experience little or no unemployment and receive much higher earnings after displacement than before. There is a presumption, therefore, that some workers actually experience an economic benefit from being displaced. Other workers receive lower wages after displacement or experience lengthy unemployment and presumably experience a loss.

D. Should Displaced Workers Be Compensated?

We assert that defense workers who are displaced should be at least partially compensated for their losses. Displacement occurs because it is desirable for political, military, and economic reasons to change the level and composition of defense expenditures. The government acts as if the economic benefits of flexible contracting and fluctuations in expenditure are considerable. In particular, the economic benefits from a major arms cutback can be quite large. It is therefore possible to compensate those who lose from defense adjustment. Opinions differ on the desirability of compensation. It is argued by some that defense workers are "overpaid" in that there is a defense premium which is compensation paid in advance for the assumed greater risks of displacement involved with defense employment. We have examined this argument below (Chapter II) and conclude that the evidence of a general defense premium is far from persuasive. It seems to us that the relatively small proportion of older workers and long service workers in defense firms indicates that defense work is relatively unstable. But this instability has only infrequently resulted from formal arms control measures in the past. As a result, it seems unlikely that many defense workers consider such measures predictable causes of employment instability and require a risk premium to "insure" them against the losses associated with displacement resulting from formal arms control measures.

While it is conceptually possible to compensate displaced workers fully, there are sound reasons to aim only at partial compensation. There is in unemployment insurance, for instance, the "moral risk" that the unemployed worker will not actively seek work or will not display the desirable degree of flexibility in setting standards for acceptable work, and it is usually presumed that this risk is directly related to the ratio of benefits to previous earnings, i.e., replacement of a higher percentage of predisplacement earnings is associated with a greater duration of unemployment. While the fringe benefits examined in this study differ with respect to the inherent moral risk attached, they all offer scope for the defect.

It seems to us that compensation is called for when government, acting for the general good, causes a change which is not in the general pattern of expectations which causes measurable losses to an identifiable group of people. The Federal government provides adjustment benefits for veterans, displaced Department of Defense civilian employees, and aid for areas affected by military base closing. If the losers among displaced defense workers can be identified and their losses measured, it seems reasonable that they should be compensated. The losses that grow out of the working of the defense contracting process could be budgeted as part of normal defense costs.

E. Pensions and Severance Pay as Compensation

In this analysis we examine the possibility that pensions, severance pay and related benefits (P and S) may be used to compensate workers suffering losses. We do not specifically examine methods of increasing L' (through special employment services and retraining, for instance), or increasing U.

The gains or losses from displacement are likely to be distributed unequally among individuals. Some groups will suffer more than others. An unemployed older worker, for instance, often faces severe problems in finding another job as good as the one he had. It happens that vested pension rights and severance are usually reasonably closely related to age, so that part of the loss differential associated with age is reduced by these benefits.

Defense employers who experience contract cancellation or reduction because of a cutback may pick over their workers, transferring some defense workers on the affected contracts to other defense or non-defense work and displacing other workers. The workers who are laid off as a result of a cutback need not have been employed on the affected contract. Thus the appropriate unit to be considered is the firm, or at least the establishment, and not simply the defense worker.

The losses experienced are also distributed among workers of non-defense employers. An unemployed non-defense worker will experience greater difficulty finding work because of the availability or competition of displaced defense workers. Similarly, workers will be displaced from non-defense industries in areas of defense concentration because of negative multiplier effects.

This problem is inherent in the analysis and cannot be remedied by identifying defense workers or better data. The impact of a defense cutback will inevitably be dispersed among workers, some of whom have only the most indirect association with defense employment. Thus at the beginning of this report we conclude that measures aimed at requiring direct provision of adjustment benefits through defense employers are likely to be inequitable, and therefore to fall short of one of the major objectives of national economic policy. It may be thought, however, that it is desirable to compensate the losers who can be identified even if those who cannot be identified cannot be compensated. We would agree if this were the only way the problem could be dealt with.

The size of vested pensions and severance pay usually depend on the earnings and duration of service of the displaced workers. Because of this, they inevitably overcompensate the fortunate few who find new jobs quickly and undercompensate the unlucky. It is not possible to modify these benefits to relate them to loss without fundamentally altering their character. They are in the nature of deferred earnings (regardless of their legal status) and obviously cannot very well depend on future events, such as duration of unemployment experienced after layoff.

Supplemental unemployment benefits (SUB), in contrast, are closely related to losses and are almost ideally suited to the compensation task. Their major defect is the degree of moral risk involved. In non-defense firms the tendency of these benefits to tie workers closely to the firm and the inducement they offer to unemployed workers to defer accepting other jobs is often considered a favorable attribute rather than a drawback, because it is presumed that the unemployment is a temporary layoff rather than a permanent displacement. In the defense firm in which displacement is permanent, it seems desirable that SUB be constructed and treated as a variable severance pay system.

F. Economic Environment

As this study is being prepared, the United States is engaged in major hostilities in Vietnam, with efforts to end the hostilities being intensified. A significant portion (perhaps a third) of the defense budget currently is for Vietnam-related purposes. The cessation of hostilities in Vietnam will mean large layoffs in defense-related employment although some of those laid off will find alternative employment in new defense jobs created as the result of changes in defense purchases. There already have been numerous efforts to project the immediate and longer-term post-Vietnam defense budget and it is not the purpose of this study to offer a separate set of projections. It can simply be assumed that there will be a substantial displacement of workers in defense-related employment after cessation of hostilities in Vietnam, partly arising from some net decline in defense spending and partly arising from shifts in defense purchases away from software and ammunition to hardware. A $15 billion cut in the defense budget now, for example, would affect the jobs of about 200,000 workers in private contractor plants and Government arsenals, in addition to jobs of Department of Defense civilian employees and jobs of workers dependent locally upon the spending of the plants and arsenals and of their employees. Reabsorption of these displaced workers into the labor force--defense related or non-defense related--will of course depend upon many factors affecting national and local labor markets and demand for particular skills.

This study is not intended to apply solely, or even primarily, to the post-Vietnam economic adjustment. However, to the extent that pensions, severance pay, and related fringe benefits could play a role in the economic adjustment of defense workers, then presumably they could play a role in that adjustment after the cessation of hostilities in Vietnam. This statement must be qualified by mention of the fact that the post-Vietnam displacement is likely to be characterized by certain differences from the situation which would apply to other circumstances of defense cutbacks--such as arms control and disarmament. Under the latter, for example, cutbacks would be heavily concentrated in the aerospace industries and would hit principally highly-skilled and specialized types of workers while in the post-Vietnam cutback those displaced are apt to be concentrated fairly heavily in the conventional ordnance industry and in the soft goods industries selling to the Department of Defense. They are likely to be less skilled. Many of them are likely to be secondary wage earners, and many of them are likely to have shorter tenure than those laid off as a result of arms control.

Once the hostilities in Southeast Asia are ended, a new defense environment will evolve. The nature of this environment is subject to much conjecture, much of it being dependent upon decisions of the new Administration and the Congress in regard to the development of an anti-ballistic missile system (ABM) and in regard to improvements in offensive missile systems. Defense purchases might grow after Vietnam, as they did after Korea, at roughly the same rate as the GNP. In which case, of course, defense worker adjustment will be easier as workers are occasionally laid off because of changes affecting shares of the defense market. Or defense spending might grow at a rate well below the economic growth rate, perhaps even remain relatively constant. Defense workers then laid off in particular circumstances would face far more serious adjustment difficulties. Finally, of course, some sort of understanding or agreement with the Soviets could be reached to curtail or limit the production of arms. Given present circumstances, it does not appear likely that such an understanding or agreement would be along the lines of general and complete disarmament proposed by the United States in September 1961 (and by the USSR in a different way earlier). Rather it is more likely, if it occurs, to involve some mutual limitation and/or reduction on "both offensive strategic nuclear delivery systems and systems of defense against ballistic missiles" which the President announced in July 1968 the Soviet Union had agreed to discuss.

The economic impact of this kind of freeze on strategic weapons will depend upon both the nature of the limitations agreed to and the production, development, and testing of weapons affected at the time. Table I-1 illustrates the direct effect on procurement of a strategic nuclear delivery freeze occurring in fiscal year 1966 as derived from estimates prepared in an earlier study for ACDA. It is not believed that the year-to-year effect now in dollar terms would be significantly different than the $2 billion reduction shown in the table.

Table I-1

Estimated 1965 to 1966 Expenditure Change as Result

of Strategic Nuclear Delivery Vehicle Freeze

	Actual 1965 (millions)	1966 (millions)	Change 1965-66 (millions)
Procurement			
Aircraft	5,543	4,950	- 593
Missiles	2,635	1,600	- 1,035
Ships	1,818	1,700	- 118
Ordnance and Vehicles	1,383	1,300	- 83
Electronics and Communications	1,087	950	- 137
Other	809	800	- 9
Total	13,275	11,300	1,975

Source: Community Adjustment to Reduced Defense Spending (ACDA, 1965), Appendix I, p. 17.

There are several advantages of emphasizing such a freeze as an underlying control assumption:

(1) Specificity: It is in advanced weapons systems, especially in R & D, that the defense industry is most specialized. Planning that takes care of adjustments to missile, aircraft, and submarine cutbacks deals with the defense industries for which adjustments are likely to be most severe.

(2) It is a reasonable kind of agreement. Both major antagonists claim superiority now; if they really believe it, then such a freeze might be possible. Such an agreement appears to be a logical next step to the nonproliferation agreement.

(3) Simplicity: Defense expenditure is a small fraction of most industry outputs. With any reasonably widespread offset program, most industries will have civilian offsets. Large scale displacements can occur only in large scale defense-oriented establishments, most of which are in aerospace industries.

Such a strategic delivery system freeze would have effects largely on missile and aircraft production and electronics. The effects would be concentrated in large firms, such as Lockheed (Poseidon) and General Dynamics (F-111), and their suppliers. These firms are heavily concentrated in defense work, and, as a result, large scale layoffs can be expected. These layoffs would be concentrated geographically and occupationally.

II. CHARACTERISTICS OF DEFENSE INDUSTRY EMPLOYMENT

A. Introduction.

By defense industry, we mean firms in manufacturing with a large proportion of their revenues arising in defense contracts. We also include research and development where carried on by privately owned manufacturing firms. Nonmanufacturing firms and industries are excluded for several reasons. First, even taken together, they account for only a relatively small fraction of total nongovernment defense-generated employment (see Table II-1). Further, the nonmanufacturing employment associated with defense expenditures typically is only a small fraction of the industry total; in transportation and trade, the principal nonmanufacturing defense employers, defense workers are only about seven per cent and one per cent, respectively, of the total industry workforce in recent years. Finally, the nonmanufacturing good or service sold is not specialized or unique to the government market. The services of transportation, warehousing and trade, or the output of agriculture and mining going to the defense market do not usually require special capital equipment, specialized workforce skills, regional concentration or other attributes distinguishing defense-associated demand from other demand. Hence, they are unlikely to be seriously affected by a large scale defense cutback accompanied by an offset program.

Manufacturing is in sharp contrast. It accounts for two-thirds of defense employment, and ten per cent of all manufacturing employment consists of defense workers. Most important, defense expenditure is concentrated in a few industries in which the product is unique to government procurement; further, defense workers in these industries are 30 to 60 per cent of total employment. Thus, special policies to ease structural dislocation may be necessary for those manufacturing industries importantly engaged in arms development and production, whereas they are not likely to be needed in most of the nonmanufacturing sector.

B. Defense Industries.

Within manufacturing, defense-related employment is concentrated in a few industries--ordnance, electronic communications equipment, aerospace, and shipbuilding. These four industries account for three-fourths of all defense-generated employment in manufacturing in recent

Table II-1
Summary of Defense-Generated, Nongovernment Employment, United States, 1965 and 1967

	(1) Employment (000's)	(2) Defense-Generated Employment (000's)	(3) (2) as a Per Cent of (1)	(4) Per Cent of Total Nongov't Defense-Generated Employment
Agriculture, Forestry, Fishing				
1965	5,034	48.5	1.0	2.3
1967	4,075	75.0	1.8	2.5
Mining				
1965	634	29.9	4.7	1.4
1967	620	40.0	1.3	1.3
Construction				
1965	3,119	60.0	1.9	2.8
1967	3,277	67.9	2.1	2.3
Manufacturing				
1965	17,604	1,390.2	7.9	66.3
1967	19,318	2,021.6	10.5	68.0
Services				
1965	28,092	572.6	2.0	27.2
1967	30,380	767.0	2.5	25.7
Total Nongovernment				
1965	54,483	2,101.2	3.9	100.0
1967	57,670	2,971.5	5.2	100.0

Source: Adapted from Richard P. Oliver, "The Employment Effect of Defense Expenditures," Monthly Labor Review (September 1967), pp. 10-11.

years.* In each of the four, defense workers are at least two-thirds of all workers (see Table II-2). The other one-fourth of defense-generated employment is scattered across a great many industries, and in each, defense workers are no more than a few per cent of the total. Since offsets to defense cutbacks will induce increased employment, it seems likely that employment opportunities will increase in many of the industries and firms in which defense employment is a small fraction of the total. As a result of this, the four principal defense industries are the main focus of this study.

C. Industry Cutback.

The particular year and composition of the assumed cutback will obviously matter greatly. We assume a strategic nuclear delivery vehicle freeze would halt production of both missiles and aircraft. If it were adopted during design and production of FB - 111, Minuteman III, Poseidon, fleet ballistic missile ship, and ABM it could have substantial employment effects. It must therefore be recognized that the employment effects cannot be predicted until a prospective date for the cutback is specified. Had such a cutback occurred in the past two years the effects would have been quite small. If the cutback occurred in FY 1969 we estimate the effects would be almost 80 per cent larger than they would have been in 1967.

To estimate the magnitude of employment effects arising from program effects, we take two steps: (1) estimate the proportion of aircraft and missile expenditure involved in strategic procurement; and (2) assume the proportion of employment in the industry is the same as the expenditure proportions.

In FY 1967 direct missile procurement was

Direct Procurement, FY 1967 (thousands of dollars)

	Ballistic	Other
Army	-	353,422
Navy	39,152	247,282
Air Force	360,180	108,600
Total	399,332	709,304

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* U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Shipments of Defense-Oriented Industries, 1965, Series MA-175(65)-2, July 31, 1967. Total defense-related employment in manufacturing covered in the survey in 1965 was 1,352,600; in the four principal defense industries, defense workers totalled 989,900.

Table II-2
Employment in Principal Defense-Oriented Manufacturing Industries, 1965

		(Employment in Thousands)		
SIC	Industry	Total Employment	Defense Employment	Defense as Per Cent of Total
19	Ordnance (except guided missiles)	78.6	57.7	73.5
3662	Radio, TV Communications Equipment	327.5	254.1	77.8
AEROSPACE				
1925	Guided Missiles	139.4	132.3	95.0
3721	Aircraft	291.4	208.5	71.7
3722	Aircraft Engines and Parts	176.8	133.5	75.5
3723 and 3729	Aircraft Propellers, Equipment & Parts, n.e.c.	155.6	120.9	77.8
AEROSPACE TOTAL		763.2	595.2	(78.2)
3731	Shipbuilding and Repairing	123.3	82.9	(67.0)
Total, Principal Defense-Oriented Industries		1,292.6	989.9	(76.5)

Source: U.S. Department of Commerce, Bureau of the Census, Current Industrial Reports: Shipments of Defense-Oriented Industries, 1965, Series MA-175(65)-2, July 31, 1967, pp. 10-13.

We estimate, therefore, that about 56 per cent of missile employment arises from strategic missile programs. It must be emphasized that this is a guess only of a figure which is not known, and is in any event rather arbitrary. Only when a specific arms cutback is programmed would its industry effects occur, and even these could only be estimated *ex post*.

For aircraft the problem is much greater. The modification and maintenance of B-52's and the production of F-111 and FB-111's are the only important strategic aircraft procurement actions in progress, and because of the multiple-purpose character of the F-111 and FB-111 the cost allocation problem is unmanageable. We conclude, therefore, that the total procurement effect of a freeze would be on the order of $1 billion, or, approximately, 10 per cent of direct procurement.

There exists no sound way to estimate the effects on the electrical equipment industry which is largely subcontracting. This is a rapidly growing industry which is in no sense concentrated in defense.

We assume, then, that a strategic vehicle freeze, appropriately offset, would have reduced aircraft employment by 10 per cent and missile employment by 50 per cent. The total economic effects of such a freeze would far outreach the mere procurement effects. We are interested exclusively in the structural effects of this change. From FY 1967 to FY 1969, ballistic missile procurement increases sharply and aircraft falls slightly.

Direct Procurement (thousands of dollars)

	1967 (actual)	1969 estimated	1969 est. (1967 dollars)
Aircraft	10,415.7	8,995.2	8,095.7
Missiles	2,039.1	3,641.9	3.277.7

In estimating 1969 employment, we assume a 10 per cent price increase. This implies a 21.5 per cent decrease in aircraft employment and a 60.7 per cent increase in missile employment. We assume all the decrease in aircraft is in nonstrategic aircraft, and all the increase in missile is in strategic missiles (ballistic and anti-missile systems). The employment estimates based on the assumption that constant dollar expenditure-employment ratios remain unchanged is given in Table II-A.

The estimated employment reductions are certainly significant, but hardly in keeping with the serious economic cutbacks. The displacement of 10 per cent of aircraft employment approximates annual gross attrition in the industry, and the net outflow from the industry for the year would be approximately tripled. The attrition in missiles is, of course, much more serious. The most significant effect is the net reduction of engineering employment. The estimated 63,000 far exceeds the estimated annual incremental supply which has been estimated at 32,000 a year.

Table II-A
Estimated Aircraft and Missile Total and Engineer and Scientist Employment, June, 1967 and June, 1969
(numbers in thousands)

	Total employment		Engineers and Scientists	
Product group	1967	1969	1967	1969
Military aircraft	681(a)	535	107(a)	84
(Strategic)	(68)	(68)	(11)	(11)
Missile	235(b)	378	45(b)	72
Ballistic	(132)	(275)	(25)	(52)
Total military	916	913	152	156
(Strategic)	(200)	(343)	(36)	(63)

(a) Estimated by subtracting commercial transport and utility aircraft employment from total aircraft. All data estimated by Aerospace Industries Association, Inc.

(b) Estimated by Aerospace Industries Association, Inc.

The magnitude of the cutbacks far exceeds those of 1962 to 1964 and clearly the reduction would have far more severe effects than this early period.

D. Age & Tenure Distribution.

Critical to our analysis is the age and tenure distribution of defense industry workforces. Unfortunately very little information about tenure and age distribution of industry is available. The relevant 1960 and 1950 Census data age (Table II-3) show quite clearly that defense industries have considerably younger workforces than most other industries. The reason for this is primarily that employment in aerospace and electronics firms fluctuates rather sharply. When employment is cut deeply, both older and younger workers are laid off and, as a result, a large group of senior employees never builds up, even during periods when industry employment is reasonably stable. During the late 1950's and 1960's there was high instability in defense firms, even though industry employment was reasonably stable.

The proportion of workers 55 years old and older in the aircraft and parts industry increased somewhat from 1950 to 1960, but its 9.4 per cent in 1960 was lower than any other listed industry. With the rapid expansion of industry employment in 1966 the proportion of older workers fell once more.

Four of the six defense displacement situations in Table II-4 show proportions of older workers similar to that of the aircraft industry in 1960, and two showed much lower proportions. These data suggest that the age composition of displaced groups are of the same order as the work forces, and in this defense industry is distinguished from nondefense industry (as is shown in Chapter IV).

A pattern of tenure of defense firms shorter than in manufacturing as a whole is shown in Table II-5. While detailed manufacturing industry data is not available, the comparison shows quite clearly that displaced defense workers had shorter tenure than employed workers in all manufacturing.

Table II-3
Age Distribution of Employment by Industry, March, 1960

1960	Per cent of employment by age Under 45	45-54	55-64	65 & Over
Total Employed	60.7	21.2	13.5	4.6
Manufacturing	64.4	21.3	11.8	2.4
A. Nondurable	63.5	21.7	12.1	2.7
B. Durable	65.2	21.0	11.6	2.2
1. Machinery, except electrical	63.3	21.4	12.6	2.6
Office, computing, and accounting machines	73.1	16.6	9.0	1.3
2. Electrical machinery, equipment and supplies	71.8	18.5	8.6	1.1
3. Transportation equipment	65.3	21.6	11.7	1.5
a. Aircraft and parts	70.9	19.7	8.5	.9
b. Ship and boatbuilding and repairing	57.1	25.1	15.1	2.7
4. Professional and photographic equipment	68.2	19.9	9.9	2.0
Professional equipment and supplies	69.2	19.3	9.4	2.1
5. Metal industries	63.4	22.0	12.2	2.4
6. Miscellaneous manufacturing industries	61.2	21.8	13.2	3.8

Table II-3 (continued)
Age Distribution of Employment by Industry, March, 1950

	Per cent of employment by age			
1950	Under 45	45-54	55-64	65 & Over
Total employed	64.8	18.3	12.0	4.9
Manufacturing	69.0	17.2	10.6	3.1
A. Nondurable	69.3	17.3	10.4	3.0
B. Durable	68.8	17.1	10.8	3.2
1. Machinery, except electrical	66.9	17.9	11.4	3.8
Office, computing, and accounting machines	71.4	15.6	9.6	3.4
2. Electrical machinery, equipment, and supplies	76.1	14.9	7.5	1.5
3. Transportation equipment	69.1	17.8	10.6	2.5
a. Aircraft and parts	77.2	14.6	6.7	1.5
b. Ship and boatbuilding and repairing	59.4	23.4	14.5	2.7
4. Professional and photographic equipment and watches	71.9	16.4	9.2	2.5
Professional equipment and supplies	71.0	16.7	9.2	3.1
5. Metal industries	66.7	17.8	12.3	3.2
6. Miscellaneous manufacturing industries	70.2	16.1	9.9	3.8

Source: 1950 U.S. Census of Population, U.S. Department of Commerce, Bureau of Census, Special Report P-E No. ID, Industrial Characteristics.

U.S. Census of Population 1960. Industrial Characteristics, U.S. Department of Commerce, Bureau of Census, P C (2) 7F, Subject Report.

Table II-4
Age Distributions of Displaced Defense Workers
(Per cent distribution)

Age in years	Martin[a]	Boeing[b]	Republic[c]	Hughes[d]	Engineers	
					Boston[e]	San Francisco[f]
Under 20	1.3	.8	9.6			
20-24	15.9	19.4		3.8	1.7	
25-34	40.4	32.5	16.6	16.6	40.6	29.7
35-44	26.3	19.2	32.7	28.6	41.4	37.7
45-54	13.7	17.3	28.2	34.4	14.1	22.4
55 and older	2.3	10.8	13.1	15.6	2.1	10.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number	2,275	3,559	5,075	1,095	290	848

a. U.S. Arms Control and Disarmament Agency, *Reemployment Experiences of Martin Company Workers Released at Denver, Colorado, 1963-64; Effects of Defense Employment Readjustments*, Arms Control and Disarmament Agency Publication 36, Washington: Government Printing Office, 1966, p. IV-11.

b. U.S. Arms Control and Disarmament Agency, *A Case Study of the Effects of the Dyna-Soar Cancellation upon Employees of the Boeing Company in Seattle, Washington*, July, 1965, Table C-3, p. 70.

c. U.S. Arms Control and Disarmament Agency, *The Post Layoff Labor Market Experiences of the Former Republic Aviation Corporation (Long Island) Workers*, Arms Control and Disarmament Agency Publication 35, Washington: Government Printing Office, 1966, p. 13. Age classes are 18 to 25, 26 to 35, 36 to 45, 46 to 55, and 56 and over.

d. Trevor Bain, *The Impact of Defense Contract Termination on the Labor Force*, University of Arizona, June, 1967, Table 2-1, p. 16.

e. Joseph D. Mooney, "An Analysis of Unemployment Among Professional Engineers and Scientists," *Industrial and Labor Relations Review*, Vol. 19, No. 4, July, 1966, p. 519.

f. R. P. Loomba, *A Study of the Re-employment and Unemployment Experiences of Scientists and Engineers Laid-off from 62 Aerospace and Electronics Firms in the San Francisco Bay Area During 1963-65*, Manpower Research Group, Center for Interdisciplinary Studies, San Jose State College, San Jose, California, February, 1967, Table 13, p. 29.

Table II-5
Tenure of Transportation Industry Workers and Selected Displaced Workers

Years of tenure	Transportation equipment[a] Male	Transportation equipment[a] Female	Boeing[b] Male	Boeing[b] Female	Republic[c] Male	Republic[c] Female	Hughes[d] Male	Hughes[d] Female	San Francisco Bay Area Engineers[e]
Less than 1	17.9	22.3	21.3	17.7	32.7	35.8	9.2	10.5	28.7
1	8.3	11.8							
2	6.8	7.9	20.5	31.7			3.0	5.0	33.0
3	10.7	14.1	20.0	14.6			1.5	4.4	
4			8.3	7.0			2.2	5.0	15.9
5	12.0	10.0	3.4	4.6	19.0	34.3	6.7	6.4	
6			20.2	16.9			64.2	65.7	22.4
7									
8	4.9	2.9							
9									
10	31.8	30.2			48.3	39.9			
11 and over			6.3	7.4			13.2	3.2	
No response	2.3	.7	-	-	-	-	-	-	-
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	-	-	2,854	904	4,483	592	1,005	326	848

a. Males transportation equipment other than automobiles, females all transportation equipment, Harvey R. Hamel,"Job Tenure of American Workers, January, 1963", Special Labor Force Report No. 36, Washington: U.S. Bureau of Labor Statistics, 1963, Table D, p. A-8.

b. U.S. Arms Control and Disarmament Agency, A Case Study of the Effects of the Dyna-Soar Cancellation upon Employees of the Boeing Company in Seattle, Washington, July, 1965, Table B-3, p. 46.

c. U.S. Arms Control and Disarmament Agency, The Post Layoff Labor Market Experiences of the Former Republic Aviation Corporation (Long Island) Workers, Arms Control and Disarmament Agency Publication 35, Washington: Government Printing Office, 1966, Table A-1, p. 91.

d. Trevor Bain, The Impact of Defense Contract Termination on the Labor Force, University of Arizona, June, 1967, Table 2.12, p. 29.

e. R.P. Loomba, A Study of the Re-employment and Unemployment Experiences of Scientists and Engineers Laid-off from 62 Aerospace and Electronics Firms in the San Francisco Bay Area During 1963-65, Manpower Research Group, Center for Interdisciplinary Studies, San Jose State College, San Jose, California, February, 1967, Distribution based on persons responding to question on offer of substitute job, Table 26, p. 43.

Table II-6
Turnover Rates, April, 1967
(Accessions or separations as per cent of employment)

	Accessions		Separations		
	Total	New Hires	Total	Quits	Layoffs
Manufacturing	3.9	2.8	4.3	2.2	1.3
Durable goods	3.7	2.6	4.1	2.0	1.3
Lumber and wood products	3.2	2.7	3.6	1.8	.9
Furniture and fixtures	4.5	3.8	5.8	3.7	1.1
Stone, clay, and glass products	5.0	3.3	4.2	2.0	1.3
Primary metal industries	2.6	1.5	3.3	1.3	1.2
Fabricated metal products	4.5	3.3	4.8	2.4	1.4
Machinery, except electrical	2.7	2.2	3.3	1.7	.7
Electrical equipment	2.9	2.0	4.3	1.9	1.4
Transportation equipment	3.7	2.3	4.1	1.5	1.8
Instruments and related products	2.8	2.4	2.9	1.6	.6
Miscellaneous manufacturing	6.0	4.0	5.1	2.8	1.3
Nondurable goods	4.3	3.2	4.6	2.4	1.4
Food and kindred products	5.6	4.0	5.6	2.5	2.3
Tobacco manufactures	2.9	1.8	4.9	1.6	2.6
Textile mill products	4.8	3.7	5.0	3.5	.7
Apparel and other textile products	5.1	3.3	6.2	2.8	2.6
Paper and allied products	3.3	2.8	3.6	2.1	.7
Printing and publishing	3.1	2.7	3.1	1.9	.6
Chemicals and allied products	2.5	2.1	2.3	1.2	.5
Petroleum and coal products	2.6	2.0	1.8	.7	.5
Rubber and plastics products n.e.c.	4.4	3.3	4.9	2.7	1.1
Leather and leather products	4.9	3.1	6.1	3.3	2.0
Aerospace industries					
Guided missiles and spacecraft complete (SIC 1925)	2.7	2.3	3.0	1.6	.6
Aircraft and parts-total (SIC 372)	2.8	2.4	2.6	1.4	.6
Aircraft (SIC 3721)	2.5	2.1	1.9	1.1	.4
Aircraft engines and parts (SIC 3722)	2.7	2.3	3.4	1.7	1.1
Other aircraft parts and equipment (SIC 3729)	4.1	3.7	4.1	2.1	.8

Source: U.S. Bureau of Labor Statistics, Employment and Earnings.

E. Instability of Defense Employment.

The instability of defense employment in strategic weapons emerges from the contracting process. In the usual pattern, a development contract or contracts are let, a production contract is let, production continues with modifications and then the product is replaced by another. By the nature of military equipment the contracting process has large single contracts the receipt of which means growth and the loss of which means shrinkage. This pattern is almost unique. Few civilian industries (other than aerospace) are exposed to such instability. By its nature, again, firm employment is unstable while industry employment is more stable.

The industry turnover data does not show high turnover for defense industries (Table II-6). In part the reason for this is that defense industries have many of the characteristics associated with low turnover, namely high wages, high levels of education and training. Moreover, the employment stability of the industry, as opposed to the firms composing it means when one firm is laying off workers others tend to be hiring. The apparent industry stability conceals a high degree of firm employment instability.

The data reported by Williamson show this quite clearly. The aerospace standard deviation of employment residuals is larger than the other industries(Tables II-7 & 8). The instability of aerospace firms is usually much larger than that of the industry. The large employment fluctuations mean that these firms are exposed to deep cuts every few years. These cuts are likely to be concentrated in particular projects, so that relatively senior workers are displaced. Thus despite the relatively low industry turnover figures, the firm employment changes can lead to a pattern of young labor force. On contraction, seniority is not much respected, and on expansion the usual preferences for younger workers tend to hold. In contrast to nondefense firms, then, we should expect defense firms to have large proportions of younger, relatively short tenure workers. This expectation is born out in most of the defense cutback studies that have been made.

Table II-7

Variation about Trend, Sales and Employment, Principal Firms and Industry Totals, 1954-1963
(Standard Deviation of Residuals as Percentage of Mean)

Industry	Number of Firms in Sample	Principal Firms				Industry Totals
		Uncorrected		Corrected		
		Average	Standard Deviation	Average	Standard Deviation	
Aerospace	12					
Sales		18.0	6.6	16.0(14.7)[a]	7.4(8.2)[a]	7.5(9.3)[a]
Employment		11.1	3.0	8.3	3.9	7.0
Chemicals	7					
Sales		7.2	4.0	6.1	4.7	3.1
Employment		8.5	6.3	8.1	8.1	1.6
Electrical Equipment	5					
Sales		8.1	3.1	7.2	3.3	3.6
Employment		6.7	2.3	4.0	3.7	5.2
Steel	7					
Sales		10.5	2.3	5.0	4.3	9.1
Employment		7.1	2.1	4.5	3.5	5.5
Aluminum	3					
Sales		6.9	2.0	4.7	2.7	4.9
Employment		6.7	2.1	n.a.	n.a.	n.a.

Source: See Table II-8.

n.a. Indicates not available.

a. Industry variability is that of the aircraft industry. The sales variability experienced when all weapons and space development and procurement expenditures are included is shown in parentheses.

Table II-8
Sales And Employment Variability Adjusted For Linear Trend, 1954-1963

Industry and Firm	Sales Rank of Firm Among 500 Largest Industrials 1963[a]	Standard Deviation of Residuals as Percentage of Mean	
		Sales[a]	Employment[a]
Aerospace			
Lockheed	20	8.8	9.5
North American	21	16.3	13.6
Boeing	25	12.2	8.9
General Dynamics	30	20.8	13.6
United Aircraft	33	13.1	5.1
Douglas	75	16.3	11.4
McDonnell	101	20.8	16.9
Hercules	120	30.4	10.2
Grumman	123	13.7	8.6
Republic	155	29.8	11.8
Northrop	162	15.2	10.8
Curtiss Wright	245	18.7	12.6
Total Aerospace Industry[c]		7.5	7.0
All weapons and space development and procurement[c]		9.3	n.a.
Chemicals			
DuPont	11	4.5	4.1
Union Carbide	27	5.7	5.0
Dow Chemical	52	2.7	1.8
Olin-Mathieson	67	3.8	5.2
FMC	87	11.3	21.0
Koppers	189	12.8	11.2
Stauffer	222	9.3	10.9
Total Chemical Industry		3.1	1.6
Electrical Equipment			
General Electric	4	6.7	8.2
Westinghouse	16	6.8	4.2
Bendix	63	5.4	4.4
Square D	360	8.4	9.3
ITE Circuit Breaker	424	13.3	7.6
Total Electrical Equipment Industry[b]		3.6	5.2

Table II-8 (continued)

Industry and Firm	Sales Rank of Firm Among 500 Largest Industrials 1963	Standard Deviation of Residuals as Percentage of Mean	
		Sales	Employment
Steel			
U.S. Steel	6	9.5	5.6
Bethlehem	17	10.7	7.4
Republic	46	11.8	9.2
Inland	64	6.8	3.1
Youngstown Sheet & Tube	84	12.4	8.1
Crucible	218	13.4	8.7
Wheeling	238	8.9	7.8
Total Steel Industry[b]		9.1	5.5
Aluminum			
Alcoa	51	5.8	6.1
Reynolds	100	5.8	5.0
Kaiser	129	9.2	9.0
Total Aluminum Industry[b]		4.9	n.a.

a. Firm data on sales and employment from Fortune's 500 Largest Industrials, 1955 through 1964.

b. Total industry sales and employment data, except aerospace, from Moody's Industrials and Monthly Labor Review, respectively.

c. Total aircraft industry and weapon space development and procurement data from Frederick M. Scherer, The Weapons Acquisition Process: Economic Incentives, Boston, Mass., 1964, pp. 57-58.

Source: Oliver E. Williamson, "The Incentives of Defense Contracting: Incentives and Performance," in Issues in Defense Economics, Roland N. McKean, ed. (New York: National Bureau of Economic Research, 1967), pp. 254-255.

F. Skill Concentration in Defense Industry.

The reemployment experience of displaced defense workers will be influenced by their skills and adaptability. A large proportion of defense workers are highly educated and trained. A very large proportion are engineers and technicians, who have, in recent years, been in high demand. A large part of this demand is defense generated, and a large scale cutback would sharply reduce the level of demand while the number of job seekers would be sharply increased. Total employment of scientists and engineers has been growing much more rapidly than employment, but two-thirds of the growth between 1950 and 1960 was for R & D employment, most of which was government.*

Defense workers are more educated than the civilian labor force as a whole.** Gray shows for typical facilities very few jobs for workers without at least a high school diploma, with college required for many.*** The respondent companies may have been pulling Gray's leg. Many of the workers in the "defense sample" examined in Chapter IV were not high-school graduates.

Nevertheless the observations illustrate the high educational and skill levels of the defense work force. Together with the young average ages it is clear that most defense workers will be quite different from the displaced worker in the nondefense cases that have been studied.

In fiscal year 1967, about 16 per cent were professional and technical workers, in contrast to 13 of the general labor force.**** In 3 of 53 occupations studied more than one-fourth of the employees were in defense work: aeronautical engineers, airplane mechanics, and physicists (see Table II- 9). Almost one-fifth of all engineers were in defense, with

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* Hugh Folk, The Shortage of Scientists and Engineers, Working Paper No. 6802, Department of Economics, Washington University, St. Louis, February, 1968.

** Irwin Gray, "Impact of Defense Expenditures on Job Opportunities and Manpower Requirements," Industrial Relations Research Association, Proceedings, 1966, pp. 314-322.

*** Op. cit., p. 316.

****Max A. Rutzick, "Worker Skills in Current Defense Employment," Monthly Labor Review, September, 1967, pp. 17-20.

Table II-9
Estimated Civilian Employment by Detailed Occupation[a] Attributable to Department of Defense Expenditures, Fiscal Years 1965 and 1967[b]
(Numbers in thousands)

Occupation	Defense-generated employment 1967	Defense-generated employment 1965	Defense-generated employment Increase from 1965 to 1967	1967 defense employment as percent of total 1967 employment[c]
All technical engineers	216	173	43	18
Aeronautical engineers	41	33	8	61
Chemical engineers	5	5	0	10
Civil engineers	18	15	3	10
Electrical engineers	58	46	12	20
Industrial engineers	20	16	4	14
Mechanical engineers	43	34	9	19
Metallurgical engineers and metallurgists	4	3	1	10
Chemists	11	8	3	10
Biological scientists	1	1	0	3
Physicists	9	8	1	38
Technicians, electrical and electronic	32	27	5	22
Technicians, other engineering and physical scientists	50	41	9	18
Draftsmen	41	28	13	14
Statisticians	1	1	0	3
Accountants and auditors	41	31	10	6
Designers, except design draftsmen	7	5	2	9
Secretaries, stenographers, and typists	225	103	42	7
Billing and bookkeeping machine operators	6	4	2	4
Accounting clerks	45	37	8	12
Carpenters	33	22	11	4
Brick and stonemasons and tile setters	7	5	2	4
Electricians	42	33	9	9
Excavating, grading, and road machine operators	9	6	3	3
Painters and paperhangers	25	19	6	5
Plumbers and pipefitters	32	26	6	10
Structural metal workers	12	10	2	13
Machinists	51	42	9	10

Table II-9 (continued)

Occupation	Defense-generated employment			1967 defense employment as percent of total 1967 employment[c]
	1967	1965	Increase from 1965 to 1967	
Machine tool operators	96	74	22	19
Blacksmith, forge and hammermen	3	3	0	6
Boilermakers	6	5	1	24
Heat treaters, annealers, and temperers	3	2	1	9
Millwrights	8	6	2	10
Molders, metal, except coremakers	6	5	1	9
Pattern and model makers	8	6	2	18
Sheetmetal workers	39	32	7	21
Toolmakers and diemakers	21	16	5	10
Assemblers	99	76	23	13
Inspectors, metalworking	53	41	12	24
Photoengravers and lithographers	3	1	2	9
Linemen and servicemen, telephone, telegraph, and power	16	12	4	4
Air-conditioning and heating mechanics	12	10	2	10
Airplane mechanics	56	46	10	40
Motor vehicle mechanics	30	23	7	4
Office machine mechanics	3	3	--	4
Cranemen, derrickmen, and hoistmen	13	10	3	9
Loom fixers	d	d	d	d
Millers	d	d	d	d
Opticians, lens grinders, and polishers	2	2	d	10
Stationary engineers	25	20	3	13
Drivers, bus, truck, and tractor	104	78	26	6
Furnacemen, smelterers, and pourers	7	5	2	9
Heaters, metal	d	d	d	d
Welders and flame cutters	48	38	10	9
Spinners, textile	1	1	--	3
Weavers, textile	2	1	1	3

a. Employment estimates cover wage and salary employees in the United States attributable to Department of Defense military functions. They do not include self-employed or domestic workers or U.S. citizens employed abroad other than military personnel. Farm employment, however, does include self-employed and unpaid family workers.

b. Total employment estimates for FY 1967 are based on the first 9 months of the year.

c. (continued next page).

almost one-fifth of electrical and mechanical engineers in defense. About one-fifth of electrical and electronic technicians and engineers and science technicians were in defense work.*

Defense engineers were concentrated in aircraft and parts and electrical machinery, equipment and supplies, two industries that would be especially affected by the hypothesized cutback.

This concentration of certain groups of workers in defense industries raises serious questions for an arms cutback of the magnitude envisaged in our assumptions. A large proportion of the workers displaced will be in occupations that have been characterized as "shortage occupations" for a large proportion of the time since 1956, but the shortages are in large part attributable to the high level of defense expenditure, especially in highly sophisticated strategic production and R & D activities. With a strategic arms cutback offset by a nonspecialized expenditure increase many of these workers will face, for the first time, unfamiliar conditions of low demand for technological occupations.

Table II- 9 footnotes (continued)

c. Defense employment is given as a percent of all employment, including self-employed. The number of self-employed workers is statistically insignificant in defense-related employment. The current employment estimates, with exceptions noted below, of occupations used in this calculation were based on unpublished data from the Bureau of the Census Current Population Survey, average 1966 projected to May 1967. These CPS estimates, except for carpenters and secretaries, are subject to considerable sampling error. Employment estimates for accounting clerks, billing and bookkeeping machine operators, machine tool operators, and inspectors, metalworking, were developed within BLS.

d. Less than 500.

Source: Max A. Rutzick, "Worker Skills in Current Defense Employment," Monthly Labor Review, September, 1967, pp. 17-20.

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* The same characteristics of defense employment that make it unsuitable as a source of jobs for hard-core unemployed or depressed areas make the average displaced defense worker more employable than the average displaced nondefense worker. See Irwin Gray, op. cit.

G. Is There a Defense Pay Premium?

It is sometimes suggested that defense workers are paid more than workers holding comparable jobs in nondefense industry. A detailed analysis of the wage structures of defense and nondefense firms is beyond the scope of this study, and it is possible only to make a few observations on the defense premium question. It should first be recognized that defense employment is concentrated in the Far West, which is a region with characteristically high wages in many occupations. Moreover, defense firms tend to be large, and it is well known that large firms often pay wages that are higher than smaller firms in the same industry. Many defense firms are organized, and the bargaining power of these firms is relatively weak because both employers and unions know that delivery time is considered critical in establishing the contractor's performance record and that many contracts are cost-plus-a-fixed-fee, so that any wage increase is paid by the Federal government. In addition, defense industries have large proportions of professional, semi-professional, and skilled workers. The relatively high wages of these "key-wage" groups probably exerts an upward pressure on the wages of less skilled workers in these companies. It is known, for instance, that service and clerical workers in such firms often receive wages that are higher than the labor market average for workers of similar skills.

It is possible to identify a few groups for which a premium might be measured. The salaries of inexperienced R. & D. scientists and engineers, are one group (see Table II-10). Clearly the salaries for defense industries are higher than for nondefense industries. The rank correlation between mean salary and the percentage of industry R. & D. funds provided by the Federal government is quite high.* The differences need not represent a defense premium, however. The defense industries employ large numbers of aeronautical and electrical engineers, occupations marked by extreme shortages in recent years.

An indirect way of detecting a premium is to compare the earnings change of displaced defense workers who were reemployed in defense and in nondefense industries.

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* For 10 industries, Spearman rank correlation of $r_s = .93$ which is significant at the 0.01 level.

Table II-10
Median and Mean Salary for Nonsupervisory R. & D. Scientists and Engineers With Less Than One Year Experience by Industry, 1963

	Monthly Salary: Median	Monthly Salary: Mean	Per Cent Government Expenditure of Total R & D 1964
Total private industry	$611	$623	-
Research institutes	514	523	-
Private consultants	604	608	-
A E C contractors	595	608	-
Government laboratories	561	543	-
Chemical and allied	599	601	20
Petroleum	578	585	8
Instruments, scientific and professional	625	632	43
Aeronautical	629	642	90
Machinery and equipment	582	587	25
Electronics and electrical equipment	631	643	62
Rubber	577	578	17
Food	550	550	0
Biological and pharmaceutical	520	516	5
Automotive	584	594	27
Space technology	603	624	-
Other	618	621	-

Source: National Science Foundation, "Basic Research, Applied Research, and Development in American Industry, 1964," Reviews of Data on Science Resources, No. 7, NSF 66-6, Washington, 1966, p. 9, table 4.

Los Alamos Scientific Laboratory, 1963 National Survey of Professional Scientific Salaries, Los Alamos: Los Alamos Scientific Laboratory, 1963.

Mooney found that three-fourths of his sample of displaced defense engineers found work in defense industry.* Of these, only one-seventh received salaries in their new jobs that were lower than in their old jobs. Among those entering commercial work, one-fourth received lower salaries in their new jobs.

	Per Cent of Sample Reemployed in:	
Change in Salary Level	Commercial	Defense
Higher	41.4	48.5
No change	34.5	37.7
Lower	24.1	13.8

Loomba's findings were similar, but in his sample, one-fourth of those reemployed in defense jobs and one-third of those reemployed in commercial jobs received lower salaries than before displacement.**

	Per Cent of Sample Reemployed in:	
Change in Salary Level	Commercial	Defense
Increase	27.2	35.4
No change	40.2	40.5
Decrease	32.5	24.1

Women constitute another group of workers with fairly concentrated wage distributions for which comparisons are possible. In the Republic study, 90 per cent of the displaced women were clerical and sales or semiskilled workers.* The median earnings for all displaced women was $496 a month. In April 1965, about the end of the period during which displacements occurred, the mean standard weekly wage in manufacturing industries in Nassau and Suffolk counties for women secretaries was $112, and for stenographers, general, was $89.**

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* Joseph D. Mooney, Displaced Engineers and Scientists: An Analysis of the Labor Market Adjustment of Professional Personnel, unpublished doctoral dissertation, Massachusetts Institute of Technology, 1966.

** Derived from data on p. 95 and p. 87 in R. P. Loomba, A Study of the Reemployment and Unemployment Experiences of Scientists and Engineers Laid-off from 62 Aerospace and Electronics Firms in the San Francisco Bay Area During 1963-65, Manpower Research Group, Center for Interdisciplinary Studies, San Jose State College, San Jose, California, February, 1967.

In the Boeing study, 68 per cent of the displaced women were clerical or sales workers, with a median wage of $405 a month.*** In Seattle in September 1964 mean standard weekly wage in manufacturing industries for women secretaries was $112.50 and for stenographers, general, was $89. These wages are comparable to the Boeing wages of the displaced group.****

These results lend limited support to the proposition that there is a defense premium for some workers, but neither these results nor the observations on wage flexibility in Chapter IV support a finding that there is a widespread and significant differential between what defense workers earn on their jobs and what they could expect to earn in nondefense jobs for which they may be qualified.

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* U.S. Arms Control and Disarmament Agency, The Post Layoff Labor Market Experiences of the Former Republic Aviation Corporation (Long Island) Workers, 1966, Table A-2.

** Bureau of Labor Statistics, Occupational Wage Survey, New York Bulletin 1430-80, Washington: U.S. Government Printing Office, August 1965, Table A-1.

*** U.S. Arms Control and Disarmament Agency, A Case Study of the Effects of the Dyna-Soar Cancellation upon Employees of the Boeing Company in Seattle, Table B-10, p. 55.

**** Bureau of Labor Statistics, Occupational Wage Survey, Seattle, Bulletin 1430-9, Washington: U.S. Government Printing Office, October 1964, Table A-1.

III. PENSION PLANS AND PENSION FUNDS IN DEFENSE INDUSTRIES: COMPARISON, ANALYSIS AND EVALUATION

A. Introduction.

This chapter presents the results of an empirical investigation of pension plans and pension funds in the most important defense industries, and in selected nondefense firms. It examines the plan provisions themselves to identify typical patterns of coverage and to reach conclusions with respect to the *prima facie* adequacy of the plans in the defense industries. The chief criteria of such adequacy, or its lack, are the provisions made in comparable nondefense firms. Further, the funds themselves are examined to provide data on the financial adequacy for the normal and for extraordinary, disarmament-associated provision of benefits. The funding investigation provides a more stringent test of the adequacy of defense industry plans in that company liability to provide benefits is invariably limited to the amounts funded or insurance purchased at the time the demand is to be met. The assumptions and methods of funding used by defense firms and their experience is contrasted with the methods and experience of comparable nondefense firms. The results of the two examinations will lead to an evaluation of the adequacy of pensions to promote labor market adjustments to substantial reductions in arms procurement.

B . The Sample.

A judgment sample of 51 firms was selected, matching defense with nondefense firms by size and industry. For some purposes, the sample was supplemented by data from selected, large nondefense firms (see Appendix).

The sample firms include a large proportion of total employment in the principal defense industries (see Table III-1). In aerospace, by far the most important single defense industry, firms in the sample account for more than one-half of total employment. Further, the regional distribution of employment of firms in the sample approximates that of all aerospace employment. The 13 sample firms are the chief aerospace employers in California, Washington, Connecticut, Missouri, Kansas and Georgia, and they provide significant coverage as well for Ohio, New York and Pennsylvania. Of the top ten states, ranked by size of aerospace employment, only Texas is underrepresented in our sample.

The electronics communication equipment and ordnance industries are adequately covered. The sample firms employ about 20 per cent of the electronics industry's workforce, and about 60 per cent of ordnance. The principal regions are included: New York-New Jersey, New England, California, Illinois-Indiana and Texas.

Table III-1
Industry Coverage, as Measured by Employment, Sample Firms

Industry	Number of Firms in Sample	Employment of Firms in Sample	Total Employment, Annual Average, 1965
Defense Industries (a)			
Aerospace (SIC 372, plus SIC 1925)	13	451,200	780,800
Electronic Components & Accessories, Communication Equipment (SIC 3662, 367)	12	137,650	607,100
Photographic Equipment, Office Machinery (SIC 386, 357)	4	39,300	273,600
Ordnance (SIC 19, less SIC 1925)	2	41,700	70,400
Shipbuilding (SIC 373)	3	10,400	158,800
Nondefense Industries			
Autos, Machinery & Components (SIC 371; 35, less 357)	7	520,000	2,379,300
Primary Metals (SIC 33)	4	365,100	1,295,600
Electrical Equipment & Supplies (SIC 36, less SIC 3662 and SIC 367)	4	291,800	1,051,000
Chemicals (SIC 28)	2	9,500	906,400

(a) These are the principal defense-oriented industries. The firm and employment totals include producers of civilian products as well as those primarily engaged in defense work.

Sources: Employment in firms: These are approximate figures, taken from annual reports, corporate directories, and similar sources.

Employment in the industries: Bureau of Labor Statistics, Employment and Earnings.

A number of firms in nondefense industries were selected to provide added comparisons for some aspects of the examination of defense firms. In general, these are large firms, drawn from the automobile, steel, nonferrous metals, machinery and electrical equipment industries. The addition of several large firms to the nondefense group almost certainly biases the sample in that large firms presumably provide the best pension coverage and adhere to the highest standards of financial and general fund administration. Use of these firms as criteria by which to judge the defense industries provides a severe test of adequacy or good performance.

C. Pension Plan Provisions.

Pension plan provisions relevant to labor market adjustment include: (1) varying dollar benefits to retired employees; (2) vesting provisions, (3) early retirement and minimum participation or extent of coverage requirements. These principal characteristics of pension plan provisions will be examined separately in the following three sections.

1. Benefits: formulas and illustrative amounts.

Pension plans in the defense industries fall into two broad groups. Formulas and benefit levels in aerospace and ordnance are similar to those of other heavy industry, whereas the firms in the electronics communication equipment industries, defense and nondefense alike, have adopted different approaches and, typically, provide smaller benefits. A second natural division is suggested by the differences between the plans for hourly paid and salaried workers. Although there is a great deal of overlap, the hourly-worker plans often use different formulas and provide lower benefit levels than are used in the plans for salaried employees.

a. Aerospace and Ordnance: hourly-worker plans. There are three basic approaches to calculating pension benefits for hourly-paid workers in defense and comparable industries. One is the automobile industry approach; the monthly retirement benefit is obtained by multiplying a flat dollar amount by the years of service. For example, $4.25 times 20 years of service yields a monthly benefit of $90. The second approach is common in machinery and electrical apparatus industries; benefits are a function of earnings as well as length of service, and earnings above and below the maximum subject to social security taxes are treated differently. A typical formula using this approach would reckon monthly benefits by multiplying years of service by the sum of 0.8 per cent of average monthly earnings below the social security limit and 2 per cent of average monthly earnings over the limit.* A third approach is used in primary metals and chemical industries, giving heavy weight to earnings at the end of a worker's career. Typical of this approach is the monthly benefit calculated by multiplying years of service by 1 per cent of the monthly average earnings during the ten year period immediately preceding retirement. There also exist a number of modifications or variants of the three basic methods.

In aerospace, the larger firms, especially those with headquarters in Pacific Coast states, have adopted the automobile industry formula to establish minima, but have added provisions to enable persons with nigher earnings to claim larger benefits (see parts A and C of Table III-2). These firms- -Boeing, Douglas, Lockheed and Aerojet- -account for the bulk of the indsutry's employment in our sample. The benefits provided for a worker retiring in 1967 with 25 years of service and average annual earnings of $5400 ranged from $93.75 to $118.75. The amounts are comparable to the automobile industry's $106.25 for a worker with the specified service and earnings characteristics, to the basic steel benefit of $125 and to electrical machinery and computer large-firm range of $81 to $112.50. The hourly-paid worker with higher earnings enjoys better benefits in aerospace than in the comparable civilian industries. A worker with 25 years of service and average annual earnings of $7800 is entitled to a monthly benefit, in aerospace, ranging from $106.25 to $150.25, varying with the firm. This amount matches or exceeds the automobile and steel industry's unchanged $106.25 and $125, respectively, and is comparable to the $93 to $168.75 provided by two noncontributory plans in the electrical machinery and computers industries.

Three large non-Pacific Coast aerospace firms in the sample used different approaches. One firm, McDonnell Aircraft, has a contributory plan which provides benefits larger than those available to employees of most firms- -for example, $162.50 per month for a 25-year man with $5400 average annual earnings and $262.50 per month with $7800 average annual earnings. These amounts are appreciably above the $105 and $205 provided by contributory plans in electrical machinery and computers. The

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* The usual approach defines average amonthly earnings as one-twelfth of average annual earnings. The social security earnings limits have varied over time. Some plans explicitly use only the $400 (1/12th of $4800) in effect for the half-dozen or so years immediately preceding our study year (1966). Others specify the amounts applicable during different periods- -for example, $300 for 1951-1954; $350 for 1955-1958; $400 for 1959-1965; $550 for 1966-1967; and $650 for 1968 and later. Still other plans refer to the limits in effect, without noting the dollar amounts, at various times.

Table III-2
Hourly-Worker or Combined Hourly-Salary Pension Formulas and Illustrative Amounts, Aerospace, Ordnance and Selected Comparable Nondefense Industries, 1965-1966

Industry and Firms	Benefit Formula	Benefits for a worker retiring in 1967, with 25 years' service, and average annual earnings of: $5400	$7800
A. AEROSPACE (all noncontributory unless otherwise indicated)			
1. Five firms, with 200,200 plan participants (81,200 in combined hourly-salary)	$3.75 to $4.75 for each year of service (with some modification for higher earnings)	$93.75 to $118.75	$106.25 to $150.25
2. Three firms, with 16,500 plan participants (2,800 in combined hourly-salary)	$1.75 to $3.75 for each year of service (with some modification for higher earnings)	$56.25 to $62.50	$62.50 to $106.25
3. One firm, with 39,400 plan participants (combined hourly-salary)	Contributory plan; company benefits related to 0.7% of annual earnings under $3,000 and 1.3% of earnings over $3,000	(reflecting employer's contribution) $52.50	$87.50
4. One firm, with about 2,000 employees	No retirement plan	0	0
5. Three firms, with 88,800 plan participants	Insufficient data available to calculate benefits		

Table III-2 (continued)

		Benefits for a worker retiring in 1967, with 25 years' service, and average annual earnings of:	
Industry and Firms	Benefit Formula	$5400	$7800
B. ORDNANCE & CHEMICALS: COMBINED HOURLY-SALARY PLANS			
Two firms, with 41,700 plan participants (one principally defense, the other not)	1.1% of average monthly earnings for the ten years immediately preceding retirement (with a minimum alternative in one firm) for each year of service	$123.75 to $145.00	$178.75
C. COMPARABLE NONDEFENSE INDUSTRIES (all noncontributory unless otherwise indicated)			
1. Automobiles, three firms with 356,000 hourly-paid plan participants	$4.25 for each year of service	$106.25	$106.25
2. Heavy Machinery, one firm with 38,500 plan participants	$6.00 for each year of service	$150.00	$150.00
3. Primary Metals, two firms with 280,500 plan participants	Highest of: $5.00 for each year of service, or 1% of average monthly earnings, last 10 years, for each year of service, less $60	$125.00	$125.00

Table III-2 (continued)

Industry and Firms	Benefit Formula	Benefits for a worker retiring in 1967, with 25 years' service, and average annual earnings of: $5400	$7800
4. Primary Metals, one firm with 38,800 plan participants	Approximately: 1¼% of average monthly earnings for each year of service, less $80 (minimum: $2.60 for each year of service)	$67.00	$86.50
5. Electrical Machinery, Computers and related, four large firms with approximately 645,000 plan participants (all in combined hourly-salary plans)	Typical formulas: Years of service multiplied by the sum of 0.75% to 1% of first $400 of average monthly earnings and 1½% to 2% of earnings over $400 (with minimum of $2.70 to $4.50 for each year of service)		
	2 noncontributory plans	$81.00 to $112.50	$93.00 to $168.75
	2 contributory plans	$105.00	$205.00

Source: Calculated from the plans received in project ACDA/E-138 files, supplemented by data in Bureau of Labor Statistics. Digest of Pension Plans, Bulletin Nos. 1435 and 1477.

employer's contribution alone, however, would provide benefits only half the size of those of the typical large aerospace, automobile or steel firm. A second firm, Martin, provides benefits a good deal smaller than those of the leading firms. Using the automobile industry formula, but with a smaller dollar amount, Martin's benefits are a flat $62.50 per month for a 25-year man, regardless of earnings. A third firm, United Aircraft, has a plan wholly administered by an insurance company. The report filed with the U. S. Welfare and Pension Plans Reports Office was inadequate to determine the benefits provided. From the size of the firm's annual contributions, however, the benefits appear to be at levels comparable to those of the leading firms.

The small aerospace firms use formulas similar to those of the larger firms, but provide smaller benefits. This appears to be a reflection more of small size of firm than of industry characteristics. Further, the defense firms provide higher benefits than nondefense firms. Ryan and Kaman, both defense-oriented, provide typical 25 year, $5400 annual earnings monthly benefits of $118.75 and $56.25 respectively, whereas two small nondefense aircraft firms, Cessna and Lear-Jet, provide $56.25 and nothing, respectively. At the $7800 level of average annual earnings, the benefits of the two defense-oriented firms are $118.75 and $106.25, whereas the benefits of the two nondefense firms are unchanged at $56.25 and nothing.

The firms in ordnance, a small industry, follow the steel industry pattern in the formula used, but provide better benefits than any other major industry. Remington, a defense-oriented firm, provides slightly higher benefits for the lower-earnings level than does Hercules, a firm producing chiefly for civilian markets, but otherwise their plans are very nearly identical. The benefits, about $124 to $145 for a 25-year, $5400 yearly man and $178.75 for the $7800 level, are exceeded only at the lower earnings level and only by one noncontributory plan. At the higher earnings level, the plans of two firms in the electrical machinery-computer industries provide larger benefits, but both are financed in large part by contributions by employees.

b. Aerospace and Ordnance: salaried-employee plans. Pension plans for salaried workers in aerospace and ordnance differ from those in comparable nondefense industries in several important ways. First, almost all of the salaried-worker plans in aerospace and ordnance are noncontributory, whereas in basic steel, automobiles and in large-firm electrical machinery and computer manufacturing, the prevailing practice provides supplemental contributory plans for salaried workers, or, in some cases, a contributory plan for all employees. Second, the aerospace firms, but not those in ordnance, have established separate noncontributory plans for salaried workers. In automobiles and steel, the basic noncontributory plan for salaried employees is the hourly worker plan; in electrical machinery and ordnance, all plans, contributory and noncontributory, cover all employees, hourly and salary alike. Finally, the aerospace plans are slightly more sensitive to earnings differences than are the automobile and steel industry plans.

The benefits provided by the noncontributory plans in aerospace and ordnance for a worker with 25 years of service and $5400 average annual earnings range from $56.25 to $168.75 (see Table III-3). Only two rather small firms, Kaman and Martin, are below the automobile industry's $106.25 at this earnings level; one large firm (Boeing) matches the basic noncontributory auto industry benefit, and all the rest match or exceed the basic noncontributory steel industry benefit. At a higher earnings level, the 25-year man with $7800 average annual earnings would receive $106.25 in one firm, and from $143.75 to $185.63 in the other aerospace and ordnance firms; in all but one small firm, Kaman, the benefits are larger in the two defense industries than those provided by the noncontributory basic plans in autos or steel. The aerospace and ordnance benefits are generally better than those provided by the electrical machinery plans, contributory and noncontributory, at lower earnings levels, and better than the noncontributory plans at higher earnings levels.

The effects of the contributory plans are more difficult to assess. A salaried worker covered by both noncontributory and contributory plans in the steel or auto industry would receive higher benefits than any aerospace or ordnance worker at the $5400 salary level and higher than most at the $7800 level. The two aerospace contributory plans, however, provide higher benefits than those in automobiles, steel or electrical machinery at the $7800 level of annual earnings. Simple comparisons of benefits provided by contributory plans with those of noncontributory plans are misleading; the higher benefits of the former represent in part the return to a retired worker of savings from his own income. They could be matched by private savings of workers covered by noncontributory plans.

Employee contributions are usually tied in some way to earnings above and below social security limits. For example, employee contributions are 2 per cent in one plan, 3 or 4 per cent in others, of earnings above $250 in one plan, or $400 or $550 per month in others. The Chrysler Corporation plan, selected for illustrative purposes, is relatively generous: an employee contributes only 2½ per cent of his earnings above $250 each month. Assuming, for simplicity, equal contributions in each period and 4 per cent interest per year, a worker retiring with 25 years of service and $7800 average annual earnings would have accumulated at retirement, from his own contributions, about $5,000. This amount would yield a retirement income of about $40 to $50 per month, varying with the actuarial assumptions. The Chrysler plan specifies a monthly retirement income

Table III-3
Salary-Worker or Combined Hourly-Salary Pension Formulas and Illustrative Amounts
Aerospace, Ordnance and Selected Comparable Nondefense Industries, 1965-1966

Industry and Firms	Benefit Formula	Benefits for a worker retiring in 1967, with 25 years' service, and average annual earnings of: $5400	$7800
C A. AEROSPACE 2			
1. a. Three large firms(a) with 128,100 plan participants (81,200 in combined hourly salary)	(noncontributory) Approximately 1½% of average monthly earnings over $350 to $400 for each year of service (or $4.75 for each year of service, if higher) plus a flat amount (e.g., $2 for each year of service)	$106.25 to $168.75	$143.75 to $168.75
b. One medium-sized firm with 7,200 plan participants	A fixed-plus-variable benefit plan, related to salary (with small employee contributions on earnings over $550 per month)	$137.50(b)	$237.50(b)
c. One small firm with 1200 participants	Insufficient data to calculate		
2. Three firms, with 14,400 plan participants (2,800 in combined hourly-salary)	(noncontributory) Varied formulas using a flat amount plus a fraction of annual earnings over the social security base, multiplied by years of service	$56.25 to $156.25	$106.25 to $185.63

Table III-3 (continued)

Industry and Firms	Benefit Formula	Benefits for a worker retiring in 1967, with 25 years' service, and average annual earnings of:	
		$5400	$7800
3. One firm, combined plan	[See Table III-2 for participants and formula]	[Reflecting only the employers' contribution:]	
		$52.50(c)	$87.50(c)
		[Reflecting all contributions:]	
		$162.50	$262.50
B. ORDNANCE			
[The two firms both had combined plans. Number of participants and formula appear in Table III-2]		$123.75 to $145.00	$178.75

Table III-3 (continued)

Industry and Firms	Benefit Formula	Benefits for a worker returing in 1967, with 25 years' service, and average annual earnings of: $5400	$7800
C. COMPARABLE NONDEFENSE INDUSTRIES			
1. Automobile, two firms, with 198,500 plan participants (all salaried)	(noncontributory) Years of service multiplied by 0.6% of average monthly earnings in 10 years preceding retirement (minimum: $4.25 multiplied by years of service)	$106.25	$106.25
	(Contributory supplement to the basic plan) Formulas differ, but benefits are identical. Typical: 1½% of average monthly earnings over $250 for each year of service	[Add to above amounts:] [Reflecting all contributions:] $75.00 [Reflecting only employers' contributions:] $38.00(c)	 $150.00 $100.00(c)
2. Heavy Machinery, one firm with 11,400 plan participants	(noncontributory) $4.00 plus 2% of average monthly earnings over $400 multiplied by years of service	$125.00	$225.00

Table III-3 (continued)

Industry and Firms	Benefit Formula	Benefits for a worker retiring in 1967, with 25 years' service, and average annual earnings of:	
		$5400	$7800
3. Primary Metals, one firm with 247,200 participants in a combined hourly-salary plan	(noncontributory) (Identical formula to that in part C.3 of Table III-2)	$125.00	$125.00
	(Contributory supplement to basic plan) (approximately) 1% of average monthly earnings over $250 multiplied by years of service	[Add to above amounts:] [Reflecting all contributions:]	
		$50.00	$100.00
		[Reflecting only employers' contributions:]	
		$16.00(c)	$42.00(c)
4. Primary Metals, one firm with 16,200 plan participants	(noncontributory) (approximate formula) Sum of 0.5% of first $400 of average monthly earnings and 1¼% of earnings over $400 multiplied by years of service	$70.50	$128.25

Table III-3 (continued)

Industry and Firms	Benefit Formula	Benefits for a worker retiring in 1967, with 25 years' service, and average annual earnings of:	
		$5400	$7800
5. Electrical Machinery, Computers and related, four large firms with approximately 645,000 participants (all in combined hourly-salary plans)	[See part C.5 of Table III-2 for formula]		
	2 noncontributory plans	$81.00 to $112.50	$93.00 to $168.75
	2 contributory plans	$105.00	$205.00

(a) Same firms as in Table III-2 for each group identified by number.

(b) Estimated, assuming constant earnings and price level over the 25 year period.

(c) Estimated by calculating the summed value of the employer's contributions to retirement, and restating that amount as an ordinary annuity of 120 certain monthly payments. (See text for illustrations and a more precise discussion of the method.)

Source: Calculated from the plans received in project ACDA/E-138 files, supplemented by data in Bureau of Labor Statistics, Digest of Pension Plans, Bulletin Nos. 1435 and 1477.

of $256.25 for an employee with the service and earnings characteristics used in these calculations. The income net of the portion associated with the employee's contributions would be about $206 to $216.* These amounts exceed by about $20 to $40 the benefits provided by the best aerospace noncontributory plans. However, similar calculations for the $5400 earnings level for the auto plan and both income levels for the steel industry's supplemental contributory plan indicate that, in general, the benefits provided, net of returns to the employees own contributions, are comparable to those provided by the noncontributory aerospace and ordnance plans. Specifically, for the $5400 salary level, the Chrysler plan provides $144 and steel $141 per month, net of the employee's return; these amounts are very near Remington's $145 and a good deal less that Douglas' $168.75, both provided by noncontributory plans. At the $7800 level, most aerospace and ordnance plans match or exceed the steel industry's $167, net of the employee's return.

c. Electronics Communication Equipment, Photographic Equipment and Comparable Firms. Nearly half our basic sample consisted of medium-sized to small firms manufacturing electronics communication equipment or components, electronic instrumentation equipment, other electrical machinery or equipment, calculating and other office machinery and photographic equipment. Although these firms are not all in one industry, they are sufficiently similar to treat as one group. Specifically, they are alike in size, recent rapid growth, reliance on highly-qualified scientific and technical manpower for innovation and product development, and the use of large numbers of women in the production processes. Half the eighteen sample firms in this group were heavily defense-oriented, and half were chiefly engaged in work for the civilian markets.

The electronics "industry," with office machinery and photographic equipment firms added, provides the greatest variety, widest range, but generally the lowest level of benefits of any of the industrial groups examined. Two principal pension approaches are found in the industry. One method, rather more common in defense-oriented firms than among the civilian producers, consists essentially of applying the automobile industry formula to calculate benefits, especially of hourly-paid workers, but using much smaller dollar amounts in the dollars-times-years of service formula (see Parts A.1 and B.1 of Table III-4). This results in benefit levels that are invariant with respect to different earnings levels and that are significantly below the heavy industry norms. For nearly all of this group of firms--Raytheon, General Precision, Lear-Siegler, Fairchild Camera, and Cutler-Hammer--benefits were approximately 50 to 60 per cent of the automobile and typical aerospace levels. Only one firm, Xerox, approached the average auto-aerospace level of about $100 per month for an hourly-paid worker retiring with 25 years of service and $5400 average annual earnings. Although the benefit levels of the civilian sector forms were a bit higher than the defense-oriented firms, the differences were not great.

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* In an employee information booklet, Chrysler asserts that the company's contributions pay "approximately 80% of the total cost of this Plan." (Chrysler Corporation, Retirement Program: Salaried Employees, Form No. 84-710-8758, p. 3.) Applying this percentage to the retirement monthly income of $256.25 yields an estimate of $204.80 attributable to the company's share of costs. The estimates of the value of the net company contribution are similar.

The second common approach to pension plans in the industry, and unique among the industries studied for this project, is the use of profit-sharing to provide for the entire retirement program in combined hourly-salary worker plans. These plans typically provide no guarantee, or even a statement of minimum or anticipated benefits. They do provide for each employee a share of a fund, and its earnings, accumulated by employer contributions of a stated fraction of profits. The employee's share is a function of his earnings, but narrow ranges between minima and maxima sharply limit the variation in share sizes among a given firm's employees. A comparison of benefits likely under profit-sharing with those provided under fixed-benefit plans is too complicated to attempt here, but the relatively greater assets per plan participant of the former suggest that profit-sharing is associated with higher benefits.

Among firms of comparable size, profit-sharing plans were slightly more common in nondefense firms. In the civilian-market group, our sample included Ampex, Victor Business Machines, Bell and Howell, Magnavox and P. R. Mallory; defense-oriented firms relying wholly on profit-sharing to provide retirement benefits were Hewlett-Packard, Tektronix and Varian Associates. The difference in assets per participant, a rough measure of the likely difference in benefits provided, is insignificant between the two groups of firms. In 1966, average assets were approximately $3,660 for the five civilian-sector firms, and $3,630 for the three defense-oriented firms of comparable size. One large defense-oriented firm, Texas Instruments, provides a single profit-sharing retirement program for all its employees; unlike most others, this plan indicates the likely level of benefits. For a worker with 25 years of service, the probable benefits are $105 and $195 monthly, at the $5400 and $7800 average annual earnings levels, respectively. The benefit is about at the aerospace and heavy industry average for hourly workers at the $5400 earnings level; it is above the heavy industry average for hourly workers at the $7800 level, but about average for salary workers. Assets per participant in this plan in 1966 were $2,590, nearly one-third lower than the average of the eight smaller firms with profit-sharing plans. The evidence of benefits and assets of this plan further supports the view that profit-

Table III-4

Pension Formulas and Illustrative Amounts, Electronics Communications and Photographic Equipment Industries, Defense and Nondefense, 1965-1966

Industry	Benefit Formula	Benefits for a worker retiring in 1967, with 25 years' service, and average annual earnings of:	
		$5400	$7800
A. DEFENSE-ORIENTED FIRMS			
1. Hourly-Worker Plans Four firms, with 24,400 (mostly hourly-paid) plan participants	$2.00 to $2.50 for each year of service	$50.00 to $62.50	$50.00 to $62.50
2. Salaried-Worker or Combined Plans One firm, with 10,400 salaried participants	(contributory) 1% of earnings multiplied by years of service	[From all contributions:] $112.50 [From only employers' contributions:] $67.50	 $187.50 $111.50
One firm, with 2,200 salaried participants	(noncontributory) $3.65 to $4.00 for each year of service	$93.00	$93.00
	(Supplemental contributory plan) 2.1% of average monthly earnings over $400 multiplied by years of service	[Add to above] [From total contributions:] $26.25 [From only employers' contributions:] $19.75	 $131.25 $108.85

Table III-4 (continued)

Industry	Benefit Formula	Benefits for a worker retiring in 1967, with 25 years' service, and average annual earnings of:	
		$5400	$7800
One firm, with 25,400 plan participants (combined hourly-salary)	(noncontributory) Complicated formula based on profit-sharing as well as minimum benefits	Approximately $105.00 (assets per participant: $2,590)	Approximately $195.00
Three firms, with 12,900 participants (combined hourly-salary)	Profit-sharing, no guaranteed benefits	Not possible to estimate (assets per participant: $3,630)	
One firm, with 7,000 employees	No retirement plans	0	0
B. CIVILIAN-MARKET FIRMS			
1. Hourly-Worker Plans Two firms, with 10,700 hourly-paid plan participants	$2.50 and $3.80 multiplied by years of service	$62.50 to $95.00	$62.50 to $95.00
2. Salaried-Worker or Combined Plans Five firms, with 19,800 participants (combined hourly-salary)	Profit-sharing, no guaranteed benefits	Not possible to estimate (assets per participant: $3,660)	
One firm, with 12,300 salaried participants	Profit-sharing, no minimum benefits	Not possible to estimate (assets per participant: $2,295)	

Table III-4 (continued)

Industry	Benefit Formula	Benefits for a worker retiring in 1967, with 25 years' service, and average annual earnings of:	
		$5400	$7800
Two firms, with 6,800 participants	Insufficient data to estimate benefits		

Source: Calculated from the plans received in project ACDA/E-138 files, supplemented by data in Bureau of Labor Statistics, Digest of Pension Plans, Bulletin Nos. 1435 and 1477.

sharing plans provide greater benefits than the conventional fixed-benefit approach.

Separate plans for salaried-workers are relatively rare in electronics, instruments and comparable firms. Only five of the eighteen firms have established separate plans. Of these, data were insufficient to estimate benefits for two, and one was a profit-sharing plan. Both the remaining plans were in defense-oriented firms, Raytheon and Fairchild Camera. The former is a contributory plan, providing benefits of $112.50 and $187.50 for 25-year employees, at the $5400 and $7800 salary levels. Although superficially comparable to the norms in aerospace, the benefits corrected to take out the effect of the employees' contributions are only $67.50 and $111.50, for $5400 and $7800 salary levels, considerably below the aerospace and heavy industry levels for salaried workers. The second firm, Fairchild Camera, provides a noncontributory basic plan with an optional contributory supplement. The benefits, net of the employees' contributions, of the combined plans are approximately $102.75 and $201.85, for the $5400 and $7800 salary levels. These benefits are below the aerospace-heavy industry averages for the lower-salaried workers, but above for the higher earnings levels.

d. Benefit Levels: summary evaluation. Overall, the approaches and benefits provided by defense firms are as good as or better than those provided in the nondefense sectors. Aerospace and ordnance are among the leading manufacturing industries, including automobiles, steel and heavy machinery, in generosity of benefit levels for both hourly and salaried employees. Electronics firms reflect a different pattern; they typically provide smaller benefits than those of heavy industry. This is most likely a result of smaller firm size, relatively large numbers of female employees, younger firms, and similar variables. The defense-oriented firms in electronics do not differ significantly in approaches or benefits provided from comparable nondefense firms in the same industry.

Comparison of plan provisions provides a first approximation, or prima facie test of adequacy. The criterion is "best practice," measured by the current provisions of firms in leading nondefense industries, which are implicitly assumed to be adequate. The defense industries, with some reservations with respect to electronics, pass this test. Another dimension of adequacy, the evaluation of benefit levels relative to some appropriately defined acceptable standard of living for retirees, will not be examined here. One observation, relevant for the evaluation of the sections immediately following, is that all of the plans assume concurrent receipt of OASDI benefits. Viewed in this light, the best plans would provide a retirement income for long-service employees of about 40 to 50 per cent of pre-retirement income.

2. Vesting provisions.

Vesting provisions are important from the points of view of equity, promoting labor market adjustments through interfirm mobility, and adequacy of benefits for the eventually-retired workers.

The typical aerospace plan provides for deferred full vesting at 10 years of service with the employer (see Table III-5). Firms with this provision for both hourly-paid and salaried employees include Lockheed, Boeing-Vertol, McDonnell and Ryan. In addition, two more firms, Aerojet and Douglas, have this provision in their salaried-employee plans. Deferred full vesting at 10 years is provided by most of the plans covering hourly-paid workers in the automobile and heavy machinery industries, and is the least stringent provision applied to large groups of workers anywhere in U. S. manufacturing.

One large aerospace firm has a superior provision for its 81,000 participants in a combined hourly-salary plan. Boeing provides partial vesting, 45 per cent of the employer's contributions, at five years of service, increasing to 100 per cent at the end of nine years of service. This is more generous than any of the hourly-worker plans in nondefense heavy industry, comparable to the 50 per cent at five years rising to 100 per cent at 10 years provided by one heavy machinery plan for salaried workers, but less generous than the deferred full vesting at five years provided for salaried employees of a large automobile firm.

A number of other aerospace plans, Douglas, Martin and Kaman, add a 40 years minimum age requirement to the 10 years of service required for deferred full vesting for hourly-paid employees. One firm, Aerojet, provides for deferred graded vesting of 50 per cent of contributions at age 35 and 10 years of service, increasing to 100 per cent at 15 years of service for hourly workers. The addition of minimum age reduces the number of persons likely to achieve vesting, but the aerospace firms with these requirements are nonetheless more generous than most other heavy manufacturing firms. The steel industry pattern provides deferred full vesting at age 40 and 15 years of service, and a leading electrical machinery manufacturer requires 15 years of service for even partial (50 per cent) vesting.

Ordnance industry firms provide deferred full vesting at 15 years of service, a provision slightly more generous than the steel industry pattern, but less so than the typical aerospace provision.

As was the case with benefit levels, the electronics and photographic equipment manufacturing firms' provisions for vesting are generally inferior to the "best-practice" provisions in heavy industry, including aerospace. Typically, electronics firms with fixed-benefit plans impose higher minimum age and comparable, or longer, length of

Table III-5
Vesting Provisions, Defense and Selected Nondefense Firms, 1966

Firms, [(a)] Industry	Participants	Hourly	Salary	Vesting Provisions[(b)]
A. **AEROSPACE**				
1 Firm	81,200	X	X	Graded: 45% at 5 years to 100% at 9 years
1 Firm[(a)]	11,400	X		Graded: 50% at age 35 and 10 years to 100% at 15 years
1 Firm	10,800		X	Graded: 50% at age 45 and 10 years to 100% at 50 and 15 years
2 Firms	27,600		X	Deferred full: 10 years service
4 Firms	113,600	X	X	Deferred full: 10 years service
1 Firm	31,800	X	X	Deferred full: age 35, 10 years service
3 Firms	67,600	X		Deferred full: age 40, 10 years service
1 Firm	6,800	X		Deferred full: age 45, 15 years service[(c)]
1 Firm				No plans
B. **ORDNANCE**				
2 Firms	41,700	X	X	Deferred full: 15 years of service
C. **COMPARABLE NONDEFENSE INDUSTRIES**				
Autos and Heavy Machinery:				
4 Firms	394,000	X		Deferred full: 10 years of service
1 Firm	36,500		X	Graded: 50% at 5 years, 100% at 10 years
1 Firm	162,000		X	Deferred full: 5 years of service
1 Firm	11,400		X	Deferred full: 15 years of service
Primary Metals				
3 Firms	319,300	X	X	Deferred full: age 40, 15 years of service

Table III- 5 (continued)

Firms, Industry[(a)]	Participants	Hourly	Salary	Vesting Provisions[(b)]
Electrical Machinery, Computers & Related				
1 Firm	282,700	X	X	Deferred full: age 35 and 10 years of service or no age limit, 15 years of service
1 Firm	138,700	X	X	Deferred full: age 40, 10 years of service
1 Firm	136,200	X	X	Graded: 50% at 15 years of service to 100% at 20 years
D. ELECTRONIC COMMUNICATIONS, PHOTOGRAPHIC EQUIPMENT				
Defense-Oriented				
1 Firm	2,200		X	Graded: 50% at 1 year to 100% at 10 years
1 Firm	6,400	X	X	Graded: 20% at 2 years to 100% at 7 years
1 Firm	4,100	X	X	Graded: 10% at 3 years to 100% at 13 years
1 Firm	10,400		X	Graded: 50% at 10 years to 100% at 20 years
2 Firms	4,000	X	X	Deferred full: at 10 years for one, at 20 years for the other
1 Firm	25,400	X	X	Deferred full: at age 50, with 10 years of service
1 Firm	16,000	X		Deferred full: at age 50, with 20 years of service
1 Firm	4,500	X		No vesting provision

Table III-5 (continued)

Firms[a] Industry	Participants	Hourly	Salary	Vesting Provisions[b]
Nondefense				
1 Firm	4,100	X	X	Graded: 10% at 1 year to 100% at 10 years
1 Firm	12,700		X	Graded: 30% at 5 years to 100% at 15 years
1 Firm	7,600	X	X	Deferred full: at age 45 with 15 years of service
1 Firm	3,100	X		Deferred full: at age 50, with 15 years of service

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(a) Some firms are listed twice, once in a group specifying characteristics of hourly-worker plans, and again in a group describing salaried-worker plans.

(b) Graded vesting provides partial vesting immediately or after a minimum period of service gradually reaching 100% as indicated. Deferred full vesting provides immediate 100% vesting when the minimum years of service and/or age requirements are met.

(c) The formula is complicated, using a sum of age and years of service. The entry is one example; age 40 and 20 years of service is another.

Source: Calculated from the plans received in project ACDA/E-138 files, supplemented by data in Bureau of Labor Statistics, Digest of Pension Plans, Bulletin Nos. 1435 and 1477.

service requirements than in other industries. Deferred full vesting at age 50 and with 10 to 20 years of service are common provisions. The firms with profit-sharing have much more generous vesting provisions. These plans typically provide partial vesting of 10 to 20 per cent per year, starting within the first three years of service, leading to full vesting at 7 to 13 years. Although one defense-oriented firm, Fairchild Camera, provides for no vesting at all, the defense and nondefense firms in these industries do not differ significantly from each other with regard to vesting.

The provisions themselves for vesting in the pension plans of defense firms are, on balance, slightly more generous than in comparable nondefense firms. They thus pass the test of prima facie adequacy. However, in most cases, in both defense and nondefense industries, the minimum requirements for vesting exclude that portion of the workforce likely to be mobile. Put another way, the typical minimum requirements for vesting result in no vesting for workers likely to move, and vesting for those who would have stayed on anyway until retirement. The stringency of the requirements may be viewed in terms of their impact on costs of providing the various benefits. According to actuaries of a leading insurance carrier providing pension plan coverage and administration, the provision of deferred full vesting at 45 years of age and 10 years of service results in costs only 3 per cent higher than if there were no vesting at all, given normal turnover experience. With 10 years of service, but no minimum age requirement, vesting increases costs by about 6 per cent.

Vesting in defense firms merits closer examination than given in this section, for two reasons. Defense industry growth and contraction experience, and hence, age and length-of-service composition of the workforce, differ substantially from comparable nondefense firms. It may be hypothesized that the defense firms' vesting provisions are less effective than they appear as a result of higher actual and likely near-future turnover than the nondefense firms. In effect, because large proportions of defense workers are young and have short tenure, the proportions of defense workers with vested benefits is likely to be smaller than the proportion of nondefense workers, despite the more liberal vesting provisions of the defense firms' plans. On the other hand, massive employment cutbacks in defense firms, affecting even workers over 40 and with more than 10 years of service, would make the vesting provisions of defense firms more significant than they would be for companies in the nondefense sectors.

3. Early Retirement.

There are two principal uses of early retirement. One is to enable early withdrawal from the labor force according to the individual worker's tastes or convenience; the other is to promote rapid and relatively painless workforce attrition as part of a policy of adjustment to sudden or large shifts in output demand, technological change and the like. The pension plans in the defense industries recognize only the first use; in none is there a mention of the second. Nonetheless, the existing provisions do establish a point of departure for a preliminary evaluation of early retirement as a workforce adjustment technique.

Almost all aerospace firms permit early retirement at age 55 with as little as ten years of service with the employer (see Table III-6). These minima are less restrictive than the automobile industry's requirement of age 60 as a minimum with ten years of service for hourly-paid workers' voluntary early retirement, or the steel industry's minima of age 60 and 15 years of service for all workers. The provisions of the heavy and electrical machinery industries are similar to the auto or steel pattern.

Electronics firms with conventional fixed-benefit plans impose higher minimum age requirements, longer service requirements, or both, than the aerospace norms, but the provisions are comparable to the auto and steel industry practices for voluntary early retirement. The typical electronics industry plans permit retirement at age 60 for workers with ten or fifteen years of service. Not only are these provisions similar to the pattern prevailing in heavy industry, but there are no significant differences between the defense and nondefense firms within the electronics-instruments group. A number of the profit-sharing plans do not provide explicitly for early retirement.

Almost all plans in both the defense-oriented group of firms and in the nondefense industries reduce the benefits payable to employees retiring before normal retirement age. The severity of the reduction varies widely from one plan or industry to another, but,as before, the provisions of the defense firms are better or, at least, no worse than those of the nondefense sector. In aerospace, three large firms--Lockheed, Douglas and Aerojet-- reduce the benefits, based on years and earnings credited at the early retirement date, by 2½ to 3 per cent per year for each year before normal retirement age. A worker with 20 years of service at age 60 would retire with only 85 to 87 per cent of the monthly benefit of a 20 year man with the same average earnings, but retiring at the normal age 65. The auto industry provision for voluntary early retirement similarly reduces benefits at age 60 to about 87 per cent of the normal. One aerospace firm--Martin--achieves similar results, but through a different approach. The benefit for a worker retiring early is calculated by first computing the amount he

Table III-6

Early Retirement Provisions, Defense and Comparable Nondefense Industries, 1966

Industry, Firms	Participants	Early Retirement Provisions: Minimum Age (Years)	Minimum Service (Years)	Benefit Reduction Formula
A. AEROSPACE				
2 Firms	83,200	55	10	Reduce by 2½% (one firm), by 3% (one firm) for each year before 65
2 Firms	12,600	55	10	At age 55, 45-48%; 67% at 60, etc.
2 Firms	97,000	55	10	Reduce: 58% at 55, 87% at 60
4 Firms	155,200	55	10	Actuarial reduction(a)
1 Firm	7,600	60	10	67% at 60, etc.
2 Firms	56,900	No data		
1 Firm	7,000	No pension plan		
B. ORDNANCE				
1 Firm	16,100	50 to 55	25 to 15	Reduce by 6% per year before 60 (if 25 years service), before 65 (if 15 years service)
1 Firm	25,600	58 to 64	36 to 18	No reduction

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Table III-6 (continued)

Industry, Firms	Participants	Early Retirement Provisions: Minimum Age (Years)	Minimum Service (Years)	Benefit Reduction Formula
C. ELECTRONICS, PHOTOGRAPHIC EQUIPMENT				
1 Firm, defense (salaried workers)	10,400	55	10	Actuarial reduction
2 Firms, defense	21,800	55	15	Actuarial reduction
4 Firms, 2 defense 2 nondefense	17,200	60 (3 firms) 62 (1 firm)	10 (2 firms) 15 (2 firms)	Reduce by 0.56% for each month before age 65 (3 firms) or actuarial reduction (1 firm)
1 Firm, defense	25,400	55	25	No reduction (profit-share only)
1 Firm, nondefense	4,100	60	10	No reduction, profit-share is payable over 15 years only
3 Firms, 2 defense 1 nondefense	23,200	No provision for early retirement (all are profit-sharing plans)		
D. COMPARABLE NONDEFENSE INDUSTRIES				
Automobiles, Heavy Machinery				
a. At worker's request				
3 Firms (hourly)	550,000	60	10	Reduced benefits, 86.7% at 60, etc.
1 Firm (salaried)	162,000	55	10	Actuarial reduction
1 Firm (salaried)	11,400	55	15	Reduced by 6% for each year before 65
1 Firm (all workers)	53,600	60	10	Actuarial reduction
1 Firm (all workers)	9,700	60	15	Actuarial reduction

Table III-6 (continued)

Industry, Firms	Participants	Early Retirement Provisions: Minimum Age (Years)	Minimum Service (Years)	Benefit Reduction Formula
b. Plant shutdown, layoff				
3 Firms	550,000	55	10	Normal benefit plus $5.20 multiplied by years of service
1 Firm (salaried)	162,000	55	10	Normal benefit at 60; actuarial reduction before 60
1 Firm (salaried)	11,400	No provision		
1 Firm (all workers)	53,600	60	10	Normal benefits plus $5.20 multiplied by years of service
1 Firm (all workers)	9,700	55	20	Normal benefits
Primary Metals				
a. At worker's request				
3 Firms	305,100	60	15	Reduced: 63 to 67% at age 60, etc.
1 Firm (salaried)	16,200	55	15	Actuarial reduction
b. Plant shutdown, layoff				
2 Firms	280,500	55	20	Full benefits
1 Firm	38,800	50	15	Full benefits

Table III-6 (continued)

Industry, Firms	Participants	Early Retirement Provisions: Minimum Age (Years)		Minimum Service (Years)	Benefit Reduction Formula
Electrical Machinery, Apparatus					
1 Firm	282,700	60		None stated	Reduce by 2.4% for each year under 65, but add $65 per month until eligible for social security
1 Firm	136,200	55		15	Reduce by 0.25% for each month before 65
1 Firm	90,000	55 or 60	and and	25 15	Reduce by 4% for each year before age 65
1 Firm	138,700	60 or 62	and and	10 30	Reduce by 1/3% each month before 65 full normal benefit

(a) Actuarial reduction means that the benefits at the early retirement date are reduced to reflect the longer payout period of a given accumulation of contributions. Plans with this "formula" do not give details; see text for detailed discussion and analysis.

Source: Calculated from the plans received in project ACDA/E-138 files, supplemented by data in Bureau of Labor Statistics, Digest of Pension Plans, Bulletin Nos. 1435 and 1477.

would have received if he had continued in employment to the normal retirement date, then applying the reduction formula.

Three smaller plans in aerospace--Cessna, Ryan and Boeing's Vertol division--reduce benefits more than the leaders, but the provisions are nearly identical to those in basic steel. A worker retiring voluntarily at age 60 receives benefits reduced to 67 per cent of the level obtainable at age 65 with the same service and earnings. In ordnance and among the electronics firms with an explicitly stated formula, the benefits are reduced by six or six and a half per cent for each year before the normal retirement age, usually 65. These results are comparable to the 67 per cent of normal benefit for voluntary early retirement at age 60 in the steel industry pattern.

Many plans, including about one third of the employees covered in our sample, do not specify a formula, but instead provide that benefits to workers voluntarily retiring early shall be reduced on an actuarial basis to reflect the longer period over which the retirement benefits are to be paid. The resulting benefit levels in these plans are most likely very similar to the more generous aerospace or heavy industry provisions.

In summary, the eligibility minima, age and service, required by the defense firms for voluntary early retirement are in most cases the same or less restrictive than the prevailing practice in comparable heavy industry. Similarly, the reduced benefits provided in defense industries to workers voluntarily retiring early are as large or larger than those provided by nondefense firms. In their provisions for voluntary early retirement, the defense firms thus pass the prima facie test of adequacy.

D . Pension Plan Financial and Funding Characteristics.

Although benefit levels and other relevant provisions of defense industry pension plans are similar to those of comparable civilian sector firms, their financial characteristics and experience differ significantly. The differences result from the application, by defense firms, of the same funding methods and actuarial assumptions used by civilian market firms to a workforce whose past employment history and future prospects are not the same as those of employees elsewhere.

1. Assets and Funding Ratios. Among the outstanding differences between defense and nondefense pension plans are full or overfunding of defense pension plans, chiefly aerospace, and fewer retired workers in the defense industries.

Adequacy of pension plan funds may be assessed from two points of view. One, the long view, is concerned with the ability of a fund to pay the promised benefits to the covered workers when they retire. The second approach is a short-run test of adequacy; it examines the capacity of a fund to meet, at the present time, its obligations to covered workers already retired, eligible to retire, or with vested benefits. A first approximation of a measure of the adequacy of pension plan funding, for both the short and longer run tests, is the ratio of reported assets to reported liabilities. This, the funding ratio, must be supplemented by an investigation of the age structure and other attributes of the workers covered, benefit formulas, funding methods and actuarial assumptions before an accurate assessment of adequacy is possible. Nonetheless, it is a useful point of departure.

With our crude measure, the ratio of reported assets to reported liabilities, nearly all employees in the aerospace plans in our sample, and for which full data were reported, are covered by fully funded or overfunded plans (see Table III-7). Among the defense-oriented electronics and instruments firms, about one-third of the employees covered by plans for which we have full data are in pension systems with full or overfunding. In ordnance and shipbuilding, only one plan was fully funded or overfunded--the Hercules plan covering employees in government plants. In the electronics and instrument firms oriented chiefly to the civilian markets, only one small plan was fully funded. Among the 21 plans of firms in the civilian-oriented automobile, machinery, electrical machinery and primary metals manufacturing industries, for which we have data, no plans were even fully funded.

In aerospace, the fully funded plans include Aerojet hourly, Aerojet salary, Boeing (except Vertol), Cessna's Aircraft Radio, Lockheed hourly, Lockheed salary, and both Martin-Marietta plans. Three of the plans are markedly overfunded. The Aerojet salary plan and the Martin-Marietta plans had not only high funding ratios, but the employer contributions in 1966 were zero or nearly so.* Of the remaining four large or medium-sized aerospace firms in our sample, the two Douglas plans did not report liabilities, and the two Thiokol plans, two McDonnell plans and United Aircraft reported neither assets nor liabilities. Only small plans were less than fully funded--two Cessna plans, Boeing Vertol, four TRW plans, Kaman and Ryan. Of these, the Kaman plan and a TRW salary plan were nearly fully funded; the ratios of assets to liabilities were 0.912 and 0.83, respectively.

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* The Martin aerospace plan reported more liabilities than assets in 1966, and it appears as less than fully funded in Table III-7. However, the number of participants in the plan had been shrinking, and the fact that the 1966 employer contributions were zero justify describing it as overfunded.

Table III-7
Funding Ratios of Pension Plan Funds, Defense Industries and Selected Nondefense Firms, 1966

Funding Ratio (Assets ÷ Liabilities	Aerospace	Ordnance and Shipbuilding	Electronics, Defense	Electronics, Civilian	Autos, Machinery and Metals
		(Number of Plans)			
Less than 0.5	1	3	3	0	6
0.50 to 0.74	7	2	4	3	9
0.75 to 0.99	2	2	1	2	5
1.00 and Over	7	1	2	1	0
Insufficient Data(a)	9	0	5	7	6
		(By Number of Participants) (thousands)			
Less than 0.5	3	24	21	0	411
0.50 to 0.74	25	16	7	8	330
0.75 to 0.99	8	5	10	10	668
1.00 and Over	175	6	21	1	0
Insufficient Data	174	0	26	34	109

(a) For electronics, these include chiefly profit-sharing plans. In the other industries, data on liabilities were not reported for some plans, assets were missing for others.

In the other industries, the Hercules plan noted above, one of the General Precision plans and the Texas Instrument basic plan were overfunded. The only fully or overfunded plan in our sample not clearly in the defense market was the Magnavox basic plan. Despite its classification as a civilian sector firm, Magnavox nonetheless sells a substantial part of its output to the Department of Defense. Among the civilian market heavy industry firms in our sample, relatively few had even high funding ratios, between 0.75 and 0.99, but three of the five plans in this category were of long established, very large firms--U. S. Steel, General Electric and Westinghouse.

The correlates or causes of high funding ratios may be inferred from some of the other data or characteristics of the plans. Some negative findings will be presented first. An examination of the distribution of the assets indicates that, between industries, high funding ratios are not associated with more assets, relative to the size of the plan. The aerospace plans, with most workers in plans with high funding ratios, have lower average and median assets per participant than in comparable civilian heavy industry (see Table III-8). In electronics and instruments, mean assets per participant are lower than in both aerospace and civilian heavy industry, but there is no significant difference between defense and in civilian market firms. The ordnance and shipbuilding group mean and median are close to those of aerospace. The low ranking of electronics, relative to aerospace and the large automobile, primary metals and machinery firms, is not surprising. The benefits defined in their plans were lower than in the other industries. However, the differences between aerospace and civilian heavy industry are in one sense surprising: benefits promised in the plans were approximately the same for employees of given service and earnings levels.

Comparison of average assets per participant in just the plans with high funding ratios does not change the results between the industries, but they do indicate differences within industries. The almost-fully funded plans of civilian heavy industry, as before, have significantly higher average assets than the fully funded or overfunded plans in aerospace, ordnance and electronics. Within industries, the plans with high funding ratios have more assets relative to plan size, on the average, than those with lower ratios. Within each industry in the defense sector, this variation reflects, in part, differences in benefit levels. In aerospace, the fully funded plans are those of the large firms; these plans provide substantially higher benefits than do those of the smaller firms. In the electronics, instruments, and ordnance defense-oriented group, the average of fully funded plans is dominated by one firm--Texas Instruments--which provides benefits a good deal above the industry average.

Table III-8
Assets, Plan Participants, and Assets Per Participant, Pension Plan Funds, Defense Industries and Selected Nondefense Firms, 1966

	Aerospace	Ordnance and Shipbuilding	Electronics, Defense	Electronics, Civilian	Autos, Machinery and Metals
Total Assets of Plans in Sample(a) ($millions)	$945.4	$160.6	$261.7	$149.7	$6,993.0
Total Active Participants of Plans in Sample(a) (thousands)	298.6	51.9	99.6	54.6	1,519.9
Mean, Assets ÷ Participants	$3,166	$3,094	$2,628	$2,742	$4,601
Distribution of Plans;					
By Assets Per Participant					
$0 to $1,000	3	2	5	0	0
$1,001 to 2,000	5	0	1	5	2
2,001 to 3,000	2	3	4	3	8
3,001 to 4,000	2	2	2	3	4
4,001 to 5,000	2	0	2	0	5
5,001 to 7,000	2	0	1	2	1
7,001 to 9,000	2	1	0	0	2
9,001 and over	1	0	0	0	0
Insufficient Data	7	0	0	0	4
Median	$2,580	$2,800	$2,564	$2,500	$3,106
Mean, Assets ÷ Participants					
Plans with High Funding Ratios(b)	$3,552	$3,604		$3,438	$5,589
All Others	$2,567	$2,603		$2,721	$3,825

(a) Assets and participants are aggregated here only for those plans for which both figures were reported. In aerospace, for example, six plans with 102,200 participants did not report total assets.

(b) High funding ratios are defined as 1.0 or higher for aerospace, ordnance and shipbuilding, and electronics. For autos, machinery and metals, high ratios are 0.75 to 0.99.

However, the principal source of variation in assets and funding ratios, especially between industries, lies in the employment characteristics of the firms and industries. The civilian heavy industry plans cover workers in industries that have grown only slowly over the past decade and a half. Employment in these industries increased by only 8 per cent from 1950 to 1960; despite relatively more rapid growth in more recent years, the average annual employment in 1966 was only about 23 per cent above the 1950 level (see Table III-9). In electrical machinery, a proxy for our electronics and instruments firms, and in aircraft and parts, the chief industry in aerospace, growth has been much more rapid. Employment in 1960 was nearly double the 1950 level in electrical machinery, and, by 1966, it was 140 per cent above the level of sixteen years earlier. In aircraft, the 1960 employment was two and a half times the 1950 level and it had almost tripled by 1966.

Table III-9
Selected Workforce and Employment Characteristics, Aircraft Electrical Machinery, Motor Vehicles, Primary Metals and Machinery Industries, 1960 and 1950-1966.

	Aircraft and Parts	Electrical Machinery	Motor Vehicles, Primary Metals, Machinery
Per cent of 1960 workforce:			
Age 45 and Over	29.1	28.1	37.3
Age 55 and Over	9.2	9.8	15.3
Per cent change, 1960 Census employment over 1950 Census employment	151.2	88.7	8.3
Per cent change, 1966 average annual employment over 1950 Census employment	191.9	140.6	23.5

Source: 1960 workforce data, by age, and 1950 and 1960 total employment in U. S. Bureau of the Census, Census of Population, 1950 and 1960. 1966 employment: U. S. Department of Labor, Bureau of Labor Statistics data.

As a result of the differences in growth rates, the participants of the civilian heavy industry plans are older and have longer service than the participants in aerospace and electronics firms' plans. In 1960, nearly 40 per cent of the workforce in the industries from which our principal civilian sector firms are drawn were age 45 or older, and one sixth were 55 or older. In aircraft and electrical machinery, only about 28 per cent of the workforce were over 45, and about 9 per cent over 55. Direct evidence of long service is not available, but the presumption is strong that the civilian sector firms do have more long service workers. Even with an assumed fifty per cent attrition of the group employed in 1950, about 40 per cent of the workforce in primary metals, automobiles and machinery industries would have, in 1966, sixteen or more years of service. By the same rough estimate, the aircraft and parts industry would have about 17 per cent of its workforce with the same length of service, and electrical machinery about 21 per cent. In fact, however, attrition almost certainly has been greater in aircraft and electrical machinery than in the comparable heavy industry group; the former include a larger proportion of women and of younger workers in their workforce. Both factors, as well as the rapid employment growth itself, engender relatively higher turnover.

Additional evidence of the age structure differences, and an illustration of the sharp contrast between civilian heavy industry and the defense firms, are the relative numbers of retired workers. In automobiles, primary metals and machinery, about 12½ per cent of the plan participants in 1966 were retired workers, whereas in aerospace, only 5 per cent were retired (see Table III-10). In electronics, the retired workers are almost insignificant in the plans of defense firms-- 1.8 per cent of all participants. The proportions of retired workers in the civilian sector electronics firms and in ordnance are much the same as in aerospace, about 4 to 6 per cent.

The civilian heavy industry plans, thus, are relatively mature plans, forced to accumulate assets rapidly by the presence of a relatively old, long-service workforce. These age and length of service characteristics further suggest that liabilities would be a good deal higher, for given retirement income levels, in civilian heavy industry than in aerospace or electronics. The present value of a future income stream to begin in the near future, the liability associated with an older worker, is substantially greater than the present value of the same income stream to be started at some far distant point in time, the liability associated with younger workers. Further, most pension plans are relatively new; few are older than 25 years, and most plans were substantially upgraded, in terms of benefits promised, within the past decade or decade and a half. The plans in the large but slow-growing civilian heavy industries must have incurred heavy initial and possibly large added supplemental liabilities as a result of their large proportions of older, longer service workers. The defense industries,

Table III-10
Retired Plan Participants,
Defense Industries and Selected Nondefense Firms, 1966

	Aero-space	Ordnance and Ship building	Elec-tronics, Defense	Elec-tronics, Civilian	Autos, Machinery and Metals
Retired (thousands)	19.9	3.3	1.8	2.2	190.0
(Per Cent of Participants)[a]	(5.0)	(6.3)	(1.8)	(4.3)	(12.6)
Retired, distribution of plans (by per cent of participants):					
0 - 2.0	9	3	7	5	2
2.1 - 5.0	7	1	5	2	1
5.1 - 10.0	5	1	2	2	10
Over 10	3	2	0	2	10
Insufficient Data	2	0	1	2	4
Mean, retired ÷ Participants x 100: Plans with High Funding Ratios[b]	4.1	1.2	1.7	0.8	14.3

(a) Total participants of only those plans for which retired participants were reported.

(b) Plans with funding ratios of 1.0 or higher in aerospace, ordnance and shipbuilding and electronics, and 0.75 to 0.99 in autos, machinery and metals.

on the other hand, accumulated fewer assets per participant, and even smaller liabilities, despite benefits comparable to the civilian market firms, because their workforces were younger both in age and length of service, and initial or supplemental liabilities were small.

To this point, the relative sizes of assets and liabilities have been explained in part by differences in benefit levels and by differences in relative proportions of older, long service workers. Within the civilian sector industries, these explanations are sufficient for the purposes of this study. However, between industries and within the defense-oriented sector, benefit levels, growth rates and age composition provide only partial or inadequate explanations. In aerospace, to illustrate further, the fully funded plans have more assets, but not more retired workers, relative to their size, than the rest of the industry.

2.Funding Methods and Actuarial Assumptions. An examination of funding methods and actuarial assumptions is necessary to an evaluation of fund adequacy. Differences in methods and assumptions certainly affect the rate of asset accumulation as well as the valuation of liabilities.

In the distribution of firms by funding methods, the defense industries very much resemble the nondefense sector of the economy. Most plans use a projected benefit approach (see Table III-11). Of these, about half use the entry age normal method, and the remainder use various modifications of individual level percentage cost or aggregate level costing. In every industry, relatively few plans use an accrued benefit or unit cost method. In the entire sample, accrued benefit funding methods are used in less than one-fifth of all plans; within each industry, they cover no more than one-fourth to one-third of the plan participants. In defense industries, United Aircraft and McDonnell are the only large firms using this approach. In civilian heavy industry, both General Electric and Westinghouse, and one smaller firm, use an accrued benefit method. In electronics and instruments, a large proportion of the plans use a defined contribution rather than a defined benefit method. Most of these are profit-sharing plans, but a few provide for employer contributions of a stated proportion of payroll or of employee contributions under the plan.

Projected benefit funding methods generate higher costs than accrued benefit methods in plans covering younger workers, and could result in overfunding if the actuarial assumptions err slightly. In aerospace, the workforce is in fact young, and many of the pension funds overfunded. It is likely that the funding method is in part responsible for the high funding ratios observed in this industry. However, this conclusion should not be interpreted as a condemnation of the method. Projected benefit methods are very widely used in all sectors of the economy. Further, they are well adapted to the benefit formulas used in most plans. Finally, overfunding would not be serious in defense industry plans if employment patterns were stable. The periodic readjustments of actuarial assumptions, required by the Internal Revenue regulations, would keep assets closely related to realistic valuations of liabilities. In brief, the principal cause of overfunding lies elsewhere.

The principal actuarial assumptions used in the plans of the defense-oriented firms also very much resemble those in the civilian sector. For mortality, most plans used the 1951 General Annuity Table, usually with some modification or projection to allow for continuing decreases

Table III-11
Funding Methods, Pension Plans in Defense Industries
and Selected Comparable Nondefense Firms, 1966

	Accrued Benefit (Unit Credit, Unit Purchase)		Projected Benefit (Entry Age Normal, Level Percentage Aggregate Cost)		Defined Contributions (Mostly Profit-Sharing Plans)	
	No. of Plans	Participants (000's)	Plans	Participants (000's)	Plans	Participants (000's)
Aerospace						
Hourly and Combined	6	96.7	12	237.4	0	-
Salary	1	7.2	7	52.3	0	-
Ordnance, Shipbuilding						
Hourly and Combined	0	-	6	49.2	0	-
Salary	2	2.7	0	-	0	-
Electronics, Defense						
Hourly and Combined	1	2.5	8	31.3	4	38.3
Salary	1	10.4	2	8.6		
Electronics, Civilian						
Hourly and Combined	2	2.2	4	18.0	6	33.9
Salary	0	-	1	1.6		
Autos, Machinery & Metals						
Hourly and Combined	3	433.8	11	585.2	3	153.4
Salary	0	-	7	347.5		

in mortality rates (see Table III-12). The different mortality assumptions do make a great deal of difference in valuing the plan liabilities and in normal costing; the probability of survival to age 65, and thus the weight accorded projected benefits, of a male at age 30 ranges from the 0.709 of the 1937 standard annuity table to the 0.861 of the 1951 table, projection C to 1965.* The use, by most firms,

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* The probabilities of survival under different mortality assumptions are summarized in Joseph J. Melone and Everett T. Allen, Jr., Pension Planning (Homewood, Illinois: Richard D. Irwin, Inc., 1966), p. 87.

Table III-12
Actuarial Assumptions, Pension Plans in Defense Industries and Selected Comparable Nondefense Firms

Actuarial Assumption	Aerospace	Ordnance and Shipbuilding	Electronics, Defense	Electronics, Civilian	Autos, Machinery and Metals
Mortality Data					
1937 SAT, with setbacks	0	1	1	0	1
1949 AT	3	0	3	0	2
1951 GAT, no modification	6	0	1	1	6
1951 GAT, projected to 1965	4	2	0	2	4
1951 GAT, projected to 1960-63	1	2	1	2	3
1951 GAT, various setbacks(a)	5	2	2	1	4
Other(b)	4	1	0	0	3
Not reported(d)	3	0	7	6	0
Normal Retirement Age					
65	12	3	3	3	14
66	0	0	2	0	0
67	3	0	0	0	0
Other(c)	3	0	0	0	2
Not reported(d)	8	5	10	10	7
Wage or Salary Progression					
Not used	12	2	9	5	14
Used, various formulas	10	5	2	1	8
No report(d)	4	1	4	7	1
Turnover					
Assumed to be zero	9	2	2	1	1
Various tables or rates	16	6	9	6	15
No report(d)	1	1	4	6	7

(a) One to two year setback for males, five to six for females.

(b) Adaptation of several tables to different age groups, special tables developed by actuary, and so on.

(c) Age 63 in one nondefense plan; all ages between 65 and 70, weighted in varying proportions in another, and so on.

(d) In the electronics, photographic and office equipment industries, most of these plans are profit-sharing and thus no actuarial assumptions are necessary.

of tables reflecting favorable or low mortality experience increases the costs and rate of asset accumulation of the plans. However, the defense industries do not differ from other industries on these grounds. Thus, by the prevailing practice test of appropriateness, the defense-oriented firms pass; their mortality assumptions are appropriate.

The normal retirement age assumption affects pension plan costs by varying both the present value of the retirement income stream and the length of the period during which contributions to meet that present value are accumulated. Other variables held constant, earlier retirement ages increase costs and the rate of asset accumulation, later ages lower them. Almost all of the plans in our sample for which the retirement age was reported assumed age 65 as normal. Only a few plans, mostly in aerospace, used a later age, or assumed that retirements would take place over a number of years. The defense industries' retirement age assumptions appear to be appropriate.

Assumptions of future wage or salary progression are found in about half of the aerospace, ordnance and shipbuilding plans, and in about one-third of the defense-oriented electronics and the civilian sector plans. Overwhelmingly, the plans with this assumption include only salaried workers, or the progression is applied only for the salaried participants of combined plans. In aerospace, the Aerojet, Cessna, Douglas, Lockheek and Thiokol salaried employee plans assume salary progression. In addition, one of the two TRW salaried worker plans, the salaried employees only in Boeing's basic plan, all workers in the Kaman and United Aircraft plans and the Aerojet hourly plan use this assumption. Of these ten plans, four are fully funded or overfunded; two have high funding ratios, but less than unity, and for three, assets or liabilities were not reported. The rates of salary increase, or ratios of present to future salaries vary so greatly that summarization is difficult. In general, they provide for at least a fifty per cent increase over a 25 or 30 year period. Some assume more rapid increases; the Aerojet salaried employees' plan, for example, assumes a three per cent per year increase.

Of the fully or overfunded plans in our sample, four of the eight aerospace plans assume wage or salary progression, as well as two of the four in ordnance or electronics. Of the twelve plans with funding ratios between 0.75 and 0.99, seven included a wage or salary progression assumption. On the other hand, 25 of the 34 plans for which we have full data and with no salary progression assumption have funding ratios below 0.75. (The relation between salary progression and funding ratios is summarized in Table III-13). There is clearly an association between the explicit incorporation of future salary increases into a plan and high funding ratios.

As with the funding method, the actuarial assumption of moderate salary progression would not alone lead to serious overfunding or unduly high normal costs. However, given that defense industries face unusual distant future uncertainty, such an assumption in their plans very likely is a significant source of overfunding.

Table III-13
Summary, Pension Plans by Funding Ratios
and Wage or Salary Progression Assumption (number of plans)

Funding Ratios	Salary Progression Assumed	No Assumption	Insufficient Data
Full or overfunded (1.0 or higher)	6	4	2
High ratios (0.75 to 0.99)	7	5	0
Average or low (below 0.75)	9	25	2
Insufficient data	4	9	13

Specific assumptions that normal turnover will reduce plan liabilities, and thus normal costs and rate of asset accumulation, are common, especially in large firm pension plans. Plans in the defense industries differ slightly from those in civilian market firms in that rather more of the former include no turnover assumption. Nonetheless, funding ratios appear to be not significantly related to the presence or absence of a turnover assumption. Only 4 of the 21 plans fully funded, overfunded, or with high funding ratios, do not use the assumption, and more than half of the plans with no turnover assumption have only average or lower funding ratios (see Table III-14).

Perhaps more interesting than presence or absence is the accuracy or appropriateness of the turnover rates actually used. Although many plans did not report the specific turnover data used in their actuarial calculations,* enough did so to permit at least a preliminary evaluation.

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* These plans typically noted that turnover assumptions were used, and that the details are filed with their actuary.

Table III-14
Summary, Pension Plans by Funding Ratios
and Use of a Turnover Assumption (number of plans)

Funding Ratios	Turnover Assumed	No Assumption	Insufficient Data
Full or overfunded (1.0 or higher)	9	3	0
High ratios (0.75 to 0.99)	9	1	2
Average or low (below 0.75)	28	6	2
Insufficient data	6	5	15

Most of the plans, both in defense and civilian market industries, used simple, very crude approximations. Attrition is treated as a function only of age, and a standard table is often used. Table III-15 illustrates the typical approach; a plan's actuary or the plan administrators decide only whether the covered workers are a low, moderate or high turnover group. They then apply the indicated set of rates. The numbers themselves suggest that the approach is arbitrary, and the use of the same tables by firms so widely diverse as a medium-sized civilian market electrical equipment manufacturer, a large aircraft engines manufacturer, a small aircraft components manufacturer and a medium-sized guided missile components manufacturer further supports this view.

Interfirm comparisons are possible for perhaps one-third of the plans in our sample, but were attempted only for aerospace, the most important defense industry. Applying the rates reported in the plans of various aerospace firms to the 1960 Census employment in the aircraft and parts industry yields an average turnover rate weighted by the industry's age and sex composition. The rates calculated for each firm reflect solely the turnover assumptions of their pension plans. The

Table III-15
Typical Conventional Turnover Assumptions Used in Pension Plans, Defense and Selected Nondefense Firms, 1966
(Male Employee Rates)

Age	Low Turnover (½ Rate A)	Moderate Turnover (Rate A)	High Turnover (Rate D)
20	50	100	150
25	50	100	125
30	38	75	100
35	25	50	80
40	15	30	60
45	7	15	40
50	0	0	20
55	0	0	0

Source: Forms D-2 (for 1966) of pension plans of Cutler-Hammer, Kaman, Thiokol and United Aircraft.

results, summarized in Table III-16, reveal the wide variation in turnover assumptions used. The high weighted average rates are three or four times the low rates. Our weighted average rates are, of course, only rough approximations. To simplify the calculations, only the highest turnover set of rates were used for male and female workers under each plan. Generally, these were the hourly worker rates for males; for females, the typical plan reported only one set of rates. The highest average rate used in the industry, in the Boeing basic plan, reflects a much more careful application, by the firm, of turnover assumptions. The company's own voluntary turnover experience, by age, sex, and so on, were used in their pension plan calculations. All the other plans used cruder approximations.

Our calculations are not appropriate for an evaluation of the individual company plans, for the workforce composition and actual turnover experience at the firm level are not known. The calculations are appropriate, however, for an industry assessment. Weighting each firm's rates by its plan participants yields, for the aerospace firms in our sample, an average assumed turnover of 7.7 per cent per year. Our sample includes a large fraction of total industry employment, and must surely contribute to, and reflect the industry's experience. In the years since 1960, total voluntary turnover (quit rate) in the industry has averaged about 12 per cent per year, and total separations are about 30 per cent

Table III-16
Assumed One Year Average Turnover, Calculated from Pension Plan Assumptions, and Plan Participants, by Firm, Aerospace, 1966

Company	One Year Weighted Average Turnover, Plan Assumption(a) (per cent)	Number of Plans	Total Participants (all plans, 1966) (thousands)
Aerojet	4.6	2	18.6
Boeing, basic	12.4	1	81.2
Boeing, Vertol	0	1	7.8
Cessna	5.7	3	8.0
Douglas	5.7	2	78.3
Kaman	9.7	1	2.8
Lockheed	6.9	2	63.6
Martin	No data	2	17.7
McDonnell	0	2	39.4
Thiokol	2.7	1	4.4
United Aircraft	5.3	1	51.5
Total plans and participants		18	313.3
Weighted average, industry(b)	7.7		

(a) Each firm's hourly worker rates and female worker rates weighted by the industry's 1960 age and sex composition.

(b) Excludes the Martin plans.

each year, on the average.* Thus, applying their own test--the various plans include assumptions only of voluntary turnover--the aerospace group of firms collectively underestimate workforce attrition by about fifty per cent annually. A tougher, but more relevant test, would involve all separations, involuntary as well as voluntary. By this standard, the plan assumptions in aerospace very significantly underestimate turnover; by our calculations, industry turnover is three and a half times greater than that assumed for pension plan participants.

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* B.L.S. turnover data.

The apparent precision of the above results must be treated with caution. Our company and industry weighted rates are only rough estimates, and probably are too low as a result of the typical pension plan exclusion of employees with less than one or two years of service. The effect of omitting this high turnover group very likely outweighs the overstatement associated with applying hourly turnover rates to salaried workers. On the other hand, the use of 1960 age and sex composition tends to overstate the average annual turnover assumption for 1966. The workforce almost certainly aged to a significant extent between these two years; growth in employment was rapid just before 1960, but very slow from 1960 to 1966.

On balance, the turnover assumptions used in the aerospace industry appear to be significant underestimates of actual turnover experience. Such underestimates result in overestimating liabilities, higher normal costs and higher rates of asset accumulation than would obtain with accurate estimates. In the context of defense industries' employment experience, underestimation of turnover very likely is a source of pension plan overfunding.

The last remaining important actuarial assumption to be considered is the interest rate. Other variables held constant, high interest rate assumptions reduce pension plan costs, low rates increase them. A wide range of interest rate assumptions are found in our sample; the lowest reported by any plan was 3 per cent, the highest was 4½ per cent. The typical large firm plan, both in defense and nondefense firms, used a four per cent interest rate assumption. The second most frequent rate was three and a half per cent. Defense industry plans differ only slightly from those in civilian market firms; lower rates are a bit more common in aerospace than in civilian heavy industry (see Table III-17). Among the fully funded or overfunded plans in our sample, two assumed three per cent (Aerojet hourly and salary plans), two assumed 3½ per cent, two assumed 3 3/4 per cent, two assumed 4 per cent, two 4½ per cent, and for two plans, no interest rate assumption was reported.

Two tests of adequacy may be applied to interest rate assumptions. One is the prevailing practice test; the other would compare the interest rate assumed with the actual and prospective earnings experience of the pension funds. By the prevailing practice test, the defense industries, especially aerospace, are a bit under par, but not seriously so. The earnings experience test suggests that, for 1966, the interest rates assumed were about right. Earnings, as a per cent of assets, were as widely dispersed as the interest rate assumptions, and in aerospace, for example, as many plans earned less than their interest rate assumption as earned more. The year, 1966, may have been unusual in that the chief consequence of rapidly rising interest rates in the economy-wide markets was to reduce pension plan earnings in many plans in our sample as a

Table III-17
Fund Earnings and Interest Rate Assumption, Pension Plans in Defense Industries and Selected Nondefense Firms
(Number of Plans)

	Aero-space	Ordnance and Ship-building	Elec-tronics, Defense	Elec-tronics, Civilian	Autos, Machinery, Metals
Interest Rate					
3%	4	1	0	0	0
3¼	1	0	0	0	1
3½	2	2	5	3	6
3 3/4	0	1	2	1	1
4	9	1	2	0	10
4½	2	0	0	0	2
Not reported	7	4	6	9	3
Earnings Rate, 1966					
Less than 2%	1	0	1	1	1
2 - 3%	1	1	5	3	0
3 - 4	11	2	6	4	9
4 - 5	7	1	1	1	7
Over 5%	3	1	0	1	4
No report	3	4	2	3	2
Earnings Relative to Interest Assumption					
Less than interest assumed	7	1	5	1	4
About the same(a)	5	2	3	2	4
More than interest assumed	8	2	1	1	12
Insufficient data(b)	6	4	6	9	3

(a) Within 0.5%.

(b) Includes those reports omitting the interest assumption, assets, or fund earnings.

result of capital losses on bonds sold. Presumably, these bonds were replaced with higher earning securities, and fund earnings should be higher in subsequent years. In any event, one year's earnings experience is an insufficient basis for a definitive evaluation of the appropriateness of the interest rate assumption. By either test, the interest rate assumptions of defense industry pension plans appear to be reasonably appropriate. Further, the interest rate assumption generally is unrelated to our crude measure of funding adequacy.

E. Pension Plans and Pension Funds in Defense Industries: Conclusion.

The preceding sections described and evaluated pension plans and pension funds in defense industries chiefly from the point of view that the firms would continue to exist, and their workforces to be employed, with about the same probabilities as civilian market firms and employees. The benefit levels, vesting, and provisions for voluntary early retirement are generally about the same in defense industry plans as in those of comparable civilian sector firms. Similarly, with few exceptions, defense industry pension plans are comparable to civilian sector plans in their funding methods and actuarial assumptions. However, defense industry pension funds did differ in that they have accumulated fewer assets per plan participant, but more assets relative to liabilities than their civilian sector counterparts. Nonetheless, if the defense firms were to continue to operate with stable employment indefinitely into the future, the overall assessment must be that their pension plans, funds and practices are adequate, and that they conform to contemporary U.S. prevailing practice.

Appendix
Pension, Severance Pay and Related Plans in Files of ACDA Project (Contract #ACDA/E-138), January 1968, By Company

Company (D) for defense company	Plan	USWPR File No.*	Form D-1 or other Plan Description	Form D-2
Admiral	Retirement income (salary only)	077919	---	X
Aerojet (D)	Salaried retirement plan	74832	booklet	X
	Hourly pension plan	74831	booklet	X
	Extended layoff plan	---	booklet	---
	Severance pay, salaried	---	copy	---
Air Products	Retirement plan	074151	---	X
	Savings and stock ownership	074152	---	X
	Pension plan, hourly	164483	---	X
Alum.Co.of America	Retirement, all employees	048410	booklet	X
	Retirement, salaried	048409	booklet	X
American Bosch Arma (D)	Bosch Div, Group I	059678	booklet	X
Ampex	All employees, retirement and profit-sharing	39129	booklet	X
	(Policy statement, profit sharing, Nov.66)			
	(Policy statement, retirement, Jan.66)			
	(Policy statement, termination, March 67)			
	(Collective bargaining agreement, IAM #1327 & #68)			
	(Collective bargaining agreement, Tool & Die Craftsmen)			
	(Ampex Annual Report, 1967)			
Bath Iron Works (D)	Group Annuity Retirement (salary only)	018958	---	X
	Pension plan, hourly	179136	---	X
Bell and Howell	Profit-sharing, retirement	050714	---	X

Appendix (continued)

Company	Plan	USWPR File No.*	Form D-1 or other Plan Description	Form D-2
Bendix Corp.	Salaried, pension, basic plan	009489	booklet	X
	Salaried, seniro retirement plan	009513	booklet	X
	Hourly, pension plan	009484	booklet	X
Boeing (D)	Voluntary savings	196367	booklet	X
	Financial security	203264	(in above)	X
	Employee retirement	9894	booklet, copy	X
	SUB plan, Vertol	202897	booklet	---
	Pension plan, Vertol	44486	booklet	X
Caterpillar Tractor	Noncontrib. pension	073066	booklet	X
	Contrib. retirement (only 722 employees)	073044	booklet	X
	Retirement, noncontrib.	135207	booklet	X
	Investment plan	135208	---	X
Cessna	Hourly, Cessna	85003	copy	X
	Salary, Cessna	85002	copy	X
	Employees, Aircraft Radio	44375	copy	X
	McCauley, Polishers #5	**	copy	**
	McCauley, IAM #225	**	copy	**
	Amendment to 85003 (1967)	---	copy	---
Chris-Craft	Retirement, salaried	147504	---	X
Chrysler (D)	Pension plan, salaried	103653	booklet	X
	Pension plan, hourly	103654	booklet (same)	X
	Retirement income, salary	103650	booklet	X
	Supplemental pension, salary	103651	booklet	X
	Insrnc., hourly	---	booklet	---
	Insrnc., salary (cler-tech, UAW)	---	booklet	---
	Insrnc., salary (sup, admin)	---	booklet	---
	SUB plan, hourly and salary	---	booklet	---

Appendix (continued)

Company	Plan	USWPR File No.*	Form D-1 or other Plan Description	Form D-2
Cutler-Hammer	Retirement plan (all employees)	016333	D-4, copy	X
	Pension plan (salaried)	014770	---	X
Douglas	(Employee Group Benefit Plans)	---	booklet	---
	Hourly, pension plan	70940	copy	X
	Salary, pension plan	70941	copy	X
	Hourly, savings plan	150502	copy	X
	Salary, savings plan	---	copy	---
	SUB plan	---	booklet	---
	(other descriptive booklets on pension, savings, medical and insurance plans)			
Dravo Corp.	Retirement plan, all employees	079289	booklet	X
Fairchild Camera (D)	Pension plan (bgng. unit)	045009	D-1, summary	X
	Retirement (salaried)	045014	D-1, copy	X
	Pension plan, hourly	167185	D-1, copy	X
Ford Motor Co.	Salaried, retirement	081549	---	X
	Salaried, savings and stock investment	086811	---	X
	Hourly, retirement	086810	booklet	X
General Electric	Pension plan, all employees	071167	booklet	X
	Savings and security, salaried employees	071793	---	X
	Union Reps. pension plan	069956	---	X
General Motors	Retirement, salaried	050584	booklet	X
	Stock purchase-savings, salaried	058438	---	X
	Retirement, hourly	---	booklet	---

Appendix (continued)

Company	Plan	USWPR File No.*	Form D-1 or other Plan Description	Form D-2
General Precision (D)	Retirement (salaried, Tarrytown, NY)	070113	---	X
	Pension plan, hourly, Aerospace group	140567	copy	X
	Pension plan, hourly, Link group	160827	D-1, copy	X
Hercules Powder (D)	Pension plan, Hercules	74461	D-1, booklet	X
	Pension plan, govt. plants	74474	D-1, booklet	X
	Retirement lump-sum	74465	D-1	(D-3)
	Dismissal wage, commercial	74468	D-1	X
	" " , Radford	74480	D-1	X
	" " , Sunflower	74481	D-1	X
	" salary, Radford	74483	D-1	X
	" salary, Sunflower	74484	D-1	(D-3)
Hewlett-Packard (D)	Profit-sharing retirement	28295	booklet	X
	Life insurance retirement	158690	booklet	X
Inland Steel	Pension plan, non-contrib., all employees	093454	booklet	X
	Optional pension plan, all employees	093592	---	X
IBM	Retirement plan, all employees	071415	booklet	X
Kaman (D)	Retirement plan, all employees	94866	D-1, booklet	X
	(Termination policy of company; single page description)			
Lear-Siegler (D)	Retirement (UAW, bgng. unit)	046977	---	X
	Retirement (IAM, unit)	046978	---	X
	Retirement (nonunion, all)	046979	D-1, copy	X

Appendix (continued)

Company	Plan	USWPR File No.*	Form D-1 or other Plan Description	Form D-2
Lockheed (D)	Hourly, basic benefit	199793	D-1, booklet, trust,agreement	X
	Certain hourly, basic	63919	D-1	X
	Salary, basic benefit	63918	D-1, booklet	X
	Letters, extension of coverage (9/29/66; 8/2/67)			
	Hourly, employee savings	199792	D-1, booklet, trust agreement	D-2 combined with plan #199793
	Salary, employee savings	199791	D-1, booklet trust agreement	
	Supplementary layoff benefits	---	copy	---
Magnavox	Retirement, noncontrib.	038494	---	X
	Savings and profit-sharing	127642	---	X
P. R. Mallory	Profit sharing, retirement	094897	---	X
	Profit sharing, retirement (past service)	094898	---	X
Martin (D)	Hourly employees, pension	035439	booklet	X
	Salary employees, pension	036737	booklet	X
McDonnell (D)	Retirement (bgng. unit)	061281	D-1, copy	X
	Retirement (nonunion, all)	061280	D-1, copy	X
Pullman, Inc.	Retirement plan, hourly, bargaining unit	059179	booklet	X
Raytheon (D)	Pension plan, hourly	108671	D-1, copy	X
	Pension plan, salaried	108672	D-1, copy	X

Appendix (continued)

Company	Plan	USWPR File No.*	Form D-1 or other Plan Description	Form D-2
Remington Arms (D)	All employees, pension and retirement	98844	booklet	X
Reynolds Metals	Retirement, hourly	018343	booklet	X
	Retirement, salary	018340	---	X
Rockwell-Standard	Retirement, salaried (Equitable)	075165	---	X
	Retirement, salaried (Hancock)	075166	---	X
	Pension plan, hourly, Timken-Detroit	075168	---	X
	Pension plan, hourly	075167	---	X
Ryan (D)	Hourly, retirement (Collective Bargaining Agreement, UAW)	001595	booklet	X
	Retirement trust, salary	001612	---	X
TRW, Inc. (D)	Salaried, pension, non-contrib.	049822	---	X
	Hourly, retirement, Cleveland (AWA)	049821	---	X
	Hourly, retirement, Detroit (UAW)	049820	---	X
	Complemental retirement, hourly	049823	---	X
	"Bankers Plan" (salary?)	049818	---	X
Tektronix (D)	All employees, profit-sharing, retirement	50145	copy	X
Texas Instruments (D)	Pension plan	64322	booklet	X
	Profit-sharing plan	63289	booklet	X
Thiokol (D)	Retirement (general plan)	072196	---	X
	Retirement (employees of Reaction Motors)	072200	---	X
Union Tank Car	Retirement, all employees	103070	---	X
	Profit sharing, Corp.& Tank Car Division	103067-A	---	X
	Profit sharing, supplemental plan	103067-B	---	X

Appendix (continued)

Company	Plan	USWPR File No.*	Form D-1 or other Plan Description	Form D-2
United Aircraft (D)	Retirement (all employees)	058415	---	X
U.S. Steel	Hourly, pension) Hourly, SUB) /Annual report, US Steel (w/some information on amounts in pension and similar funds)/	033658	booklet) booklet)	X
Varian (D)	Retirement	076689	---	X
Victor	Victor Employees Security Fund	090910	booklet	X
	Victor Group Insurance (1966 Annual Report, Victor Comptometer Corp.)	---	booklet	---
Wagner Electric	Pension plan, non-contrib., all employees	106934	---	X
	Retirement annuity plan	106931	---	X
Westinghouse	Pension plan, all employees	084570	booklet	X
Xerox	Hourly workers, negotiated with Xerox Division, Amal. Clthg. Workers	55013	D-1, copy	X
	Salaried workers, profit-sharing, retirement	26907	copy	X

* Assigned by the U.S. Welfare & Pension Plan Reports Office of the Department of Labor.

** Fewer than 100 employees, thus exempt from reporting (Form D-3, reporting exemption is included).

IV. EXPERIENCE OF DISPLACED WORKERS

A. Introduction.

The problem of large-scale displacement differs somewhat from the problem of periodic unemployment resulting from lack of work or displacement of a few workers arising from technological change or changes in market demand. This chapter examines these differences and the adjustments to displacement that workers may make. The adjustment that is most specific to our study is withdrawal from the labor force. Results of earlier studies show that this has not been a very common adjustment to displacement, even among older workers.

The displacement losses of older workers are treated in detail in a separate section. Relative to younger workers, displaced older workers tend to be unemployed for longer periods, and are likely to experience greater reduction in pay if they are reemployed. Older workers tend to make fewer of the adaptations which contribute to finding another job. They are less mobile than younger workers geographically, industrially, and occupationally.

The special problems of engineers are also treated in a separate section. Engineers are one occupational group that would be heavily impacted by an arms cutback affecting the aerospace industry, and the highly favorable labor market for engineers would very quickly change.

B. The Problem of Displacement.

Large scale displacement occurs when a group of workers constituting a large percentage of the local labor force are laid off or discharged in a brief period of time. The problems faced by such displaced workers are usually more severe than those laid off in cyclical downturns or in small scale layoffs resulting from the normal working of markets, because:

1) Each displaced worker competes with many others in the same category for a limited number of jobs.
2) The displaced worker may be highly specialized, or specialized in the skills associated with a declining industry.
3) Displaced workers may be overpaid by local labor market standards.
4) There may be prejudice against hiring such workers.

There is likely to be a considerable difference in the characteristics of displaced defense and nondefense workers. Displacement of nondefense workers often occurs in old plants which have large proportions of older or unskilled workers, and in situations in which the workers are reputed to be overpaid, the company is thought to have hostile or uncooperative labor-management relations, or is thought to be obsolete or obsolescent. Nondefense layoffs usually occur only when a plan is inefficient or beyond redemption, because few large nondefense firms go out of business, and most of them are reluctant to close plants if it is possible to save them.

Nondefense displacements are most likely to occur during periods in which the labor market is generally depressed. The experience in a number of nondefense layoffs suggest that reemployment presents very serious problems for the displaced workers. Such instances have been studied extensively, and the problems presented suggest that a large proportion of workers in such situations must make large reductions and adjustments in job standards if they are to be reemployed and even then there are many (especially older workers) who will not be able to find jobs.

The results of studies of defense displacements show roughly similar results, but workers in such displacements are typically much younger, are somewhat more willing to move, and are equipped with more modern skills, so that the gross experience of the displaced groups is somewhat better than in nondefense displacements.

In most of the cases that have been studied, the mass displacement has taken place in a labor market in which the company was a major employer. The initial impact has been a considerable rise in unemployment, and increased difficulties even for workers who would normally have little trouble finding a job. Because many displaced workers are reluctant to leave the area, they experience relatively high unemployment. Those who leave the area typically are reemployed much more quickly.

The duration of unemployment and the reemployment experience of the displaced workers are uniformly influenced by the age of the worker. Much larger proportions of younger workers are reemployed after any given lapse in time and the duration of unemployment of older workers is uniformly longer than for younger groups. Despite the age differences, large proportions of displaced workers in each age group are eventually reemployed.

Women typically experience slower reemployment than men, and much larger proportions of women in younger and medium age groups withdraw from the labor force. Even among male older workers withdrawal from the labor force is not very common.

The reemployment experience of unskilled workers is usually much less favorable than that of skilled workers. White-collar workers usually find employment somewhat faster than blue-collar workers. White-collar workers are also likely to show a greater willingness to move place of residence in order to increase their chances of finding a job.

C. Adjustments by Displaced Workers.

Displaced workers must display one or more of several kinds of adjustment if they are to be reemployed. At the very least, the worker must be willing to accept another job similar to the one held with another employer. Other possible patterns include:

1) Movement to another location of the same company (transfer).
2) Movement to another industry (industrial mobility).
3) Movement to another occupation (occupational mobility).
4) Movement to another locality (geographical mobility).
5) Withdrawal from the labor force.
6) Reduction in wages demanded below previous wage (wage flexibility).

For defense workers the problem of wage flexibility may be particularly severe, because of the alleged higher salary scales that characterize defense employment (investigated above). Defense workers seem to have exhibited fairly high wage and occupational flexibility in the past, however, and in the event of a major layoff a continuation or even increase in the flexibility may well be expected. The actual question appears to be one of the short-run absorptive capacity of labor markets for such workers. There seems little question that much of the skills and experience of defense workers will have little transferrability to nondefense industry.

1. Transfer. There have been several opportunities to observe the willingness of workers to accept transfers to other plants of the same company.* Generally, it may be observed that transfer involving geographical mobility are the one great exception to the very high desire for job security displayed by workers. In each instance, fewer than one half of the respective work forces eligible for transfer were willing to accept transfer as an alternative to permanent severance. Clearly two powerful motives are in conflict, the homing instinct that encourages people to stay put and the motivation toward protecting employment and job security. Generally it is those workers who might expect the greatest difficulty in finding a suitable new job who are most willing to move, although in many instances these are also the workers who might be expected to be most attached to the locality because of age, homeownership, or school obligations.

Uncertainty over security of the new job also plays an important role. Typically the transferring worker has less protection from his seniority in the new plant that he had in the old, so that he often believes that his new job would be insecure. This clearly works against the worker being willing to move.

The conflicts between generally greater unwillingness to change associated with increasing age and the recognition of the greater difficulties of finding a new job experienced by older workers apparently offset each other to a degree so that sharp differences in willingness to transfer are not found associated with age in the studies cited.

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* See, for instance, Margaret Gordon and Ann H. McCorry, "Plant Relocation and Job Security--A Case Study," Industrial and Labor Relations Review, Vol. 11, No. 1 (October, 1957), pp. 13-36; Arnold R. Weber, "The Interplant Transfer of Displaced Employees," in Adjusting to Technological Change, Gerald Somers et al. editors (New York: Harper & Row, 1963); and Richard C. Wilcock and Walter H. Franke, Unwanted Workers: Permanent Layoffs and Long-Term Unemployment, New York: Free Press of Glencoe, 1963, pp. 100-104.

Transfer does not seem likely to become a major path of adjustment for many displaced defense workers. The problem of coordinating a cutback program with an offset program is part of the difficulty. The firm that is losing defense business may in a few instances convert to nondefense smoothly, but the transition will in most instances involve lags of many months.* The skill-mix of the new activities may differ considerably from that of the old activities. In some examples (such as Boeing) many of the firm's activities will be concentrated in a single metropolitan area, in others (such as Lockheed), the firm's activities may be widely dispersed, with strategic production concentrated in some part of the country and civilian or non-strategic defense production in others. These problems together with the general reluctance of production workers in previous studies to accept transfer tend to minimize the importance of transfer for displaced defense workers except for salaried workers, especially engineers. A defense concentrated firm may succeed in inducing a significant part of its salaried work force to relocate in an arms cutback situation similar to the one assumed in this study. We believe this is possible despite a lack of outstanding success in earlier relocation or transfer situations. As we show above, a ctuback of the kind assumed would have major specialized effects on engineering and scientific workers and it seems likely that a large proportion of such workers would follow jobs within the firm rather than take their chances in what is likely to be a rather depressed market for such workers.

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* The difficulties of conversion from defense to civilian activities must not be minimized. Many of the defense concentrated firms have had little commercial experience and lack the design and marketing expertise and organization necessary for success. It is not a matter of reconnecting to civilian activities as after World War II or the Korean War, but of entering for the first time. These problems are carefully examined in U. S. Arms Control and Disarmament Agency, Defense Industry Diversification (Washington, D. C.: U.S. Government Printing Office, 1966).

2. Industrial Mobility. In the examination of the remaining paths of adjustment we will draw on a sample of displaced workers drawn from separate studies of earlier displacements of defense workers. These studies relate to the experiences of: (1) workers laid off at the Boeing Company in Seattle*; (2) workers displaced at Republic Aviation on Long Island**; (3) workers laid off at Martin in Denver.***

The sample used in the analysis is made up of 14,333 workers from the Boeing, Martin, and Republic studies for whom usable data was available.**** The separate layoff studies are the sources for treatment of the problems arising from the three layoffs in the three cases which are treated there. We will call this combined sample the "defense sample."

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* A Case Study of the Effects of the Dyna-Soar Contract Cancellation Upon Employees of the Boeing Company in Seattle, Washington, United States Arms Control and Disarmament Agency Publication 29, Washington, D. C.: U.S. Government Printing Office, 1965.

** The Post Layoff Labor Market Experiences of the Former Republic Aviation Corporation (Long Island) Workers, United States Arms Control and Disarmament Agency Publication 35, Washington, D. C.: U.S. Government Printing Office, 1966.

*** Reemployment Experiences of Martin Company Workers Released at Denver, Colorado, 1963-1964; Effects of Defense Employment Readjustments, United States Arms Control and Disarmament Agency Publication 36, Washington, D. C.: U.S. Government Printing Office, 1966.

**** The defense sample data used in this chapter were furnished by Mssrs. Leslie Fishman, Curt Easton, Byron Burger, and Jay Allen of the University of Colorado.

Rather than review industry mobility in general, we choose to concentrate on the problem of workers moving out of defense manufacturing.* As we argued in Chapter II it seems unlikely that the adjustment problems of most displaced workers from defense nonmanufacturing industry will be either large or particularly difficult. In order to adapt the data of the defense sample to the problem that we wish to examine we will frequently consider the experience of the defense workers who moved into nondefense employment.** While a cutback of the kind assumed would leave non-strategic defense activity largely unaffected, it would presumably not be accompanied by an expansion of these activities, so that relatively few of the displaced defense workers could expect to move into defense work.

Earlier studies of displacement reviewed below show quite clearly that age is the characteristic most closely related to difficulty of reemployment.

How successful were older workers in finding nondefense jobs? From Table IV-1 we can see that the proportion of displaced workers finding jobs by the time of the study tended to decrease with increasing age. Thus older workers less frequently found jobs than did younger workers. Moreover, larger proportions of those older workers who found jobs found them in defense work. It is not obvious that these older workers remaining in defense industry were unable to find civilian jobs, but this is the most likely interpretation. In a labor market in which defense jobs were scarce, the reemployment experience of older workers might be even less favorable relative to the experience of younger workers.

The lesser difficulty with which more older defense workers found defense work raises the question: is defense industry less discriminatory than nondefense industry? This is probably true, for displaced defense workers, at least. Defense employers are probably more willing to employ senior former defense workers in good jobs than are nondefense employers.***

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* Admittedly defense to non-defense employment is a rather specialized concept of interindustry movement, but we believe it is the most significant change for our purposes.

** In the Boeing survey there was no explicit classification of the industry of reemployment into defense and non-defense classes and it was necessary to assume that SIC codes 19 and 37 were defense and all other industries were non-defense. We do not believe that this assumption causes fundamental violence to the data.

*** There are exceptions, of course. One defense industry respondent mentioned that his firm had earlier hired large numbers of workers displaced by a cutback "under pressure" from government agencies, but he believed that most of them proved unsatisfactory. Left to itself, he alleged, the firm would have hired very few of the workers because of the bad reputation of

Table IV-1
Age in Years by Labor Force Status
(Per cent distribution)

Labor force status	Age in years No response	Less than 25	25-34	35-44	45-54	55 and older	Total	Number
No response	3.6	0.5	0.3	0.4	0.9	1.0	.6	79
Employed	87.5	72.9	78.7	72.0	62.1	43.0	69.5	9,958
Defense	19.6	20.6	27.3	31.0	28.0	18.3	26.3	3,771
Nondefense	42.9	43.0	43.0	34.0	26.1	16.1	35.0	5,013
Not classified	25.0	9.3	8.3	6.9	8.0	8.6	8.2	1,174
Unemployed	1.8	15.7	15.9	21.5	29.8	41.4	22.2	3,184
Not in labor force	7.1	10.9	5.1	6.1	7.2	14.5	7.7	1,102
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Number	56	2,602	3,978	3,554	2,835	1,308	-	14,333
Per cent of reemployed in defense	31.4	32.41	38.8	47.9	51;8	53.3	42.9	-

Source: Defense sample.

As might be expected, relationships similar to those of age and industry were observed for seniority and industry (Table IV-2). Except for the lowest seniority groups (many of whom were women) the more seniority a worker had the less likely he was to be reemployed by the time of the survey. Of those who were employed, the proportion remaining in defense industry was highest in the highest seniority group.

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the plant in the industry. Employers outside the industry would presumably be less well informed. Such stories are told of almost all plant closings or mass layoffs, and it is difficult to decide how much credit they deserve. The prevalence of such stories both in defense and nondefense situations suggests that they are characteristic of displacement situations in general. A large proportion of job openings that are filled are filled by employed workers who change jobs with no intervening period of unemployment. Everyone knows that, like a loan, a job is easier to find if you can prove you don't need it. No doubt many employers believe there is something seriously wrong with a firm and its work force if it cannot continue. A defense plant closing always raises the question of why that plant could not win another contract--was it technologically obsolete, or were its costs too badly out of line?

Table IV-2
Seniority by Defense or Nondefense Reemployment

Industry of reemployment					Seniority in years						
	No response	<1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8 or more	Total
No response or not applicable	27	706	977	825	433	227	392	269	212	1,471	5,539
Defense	10	451	730	497	329	212	308	119	111	1,006	3,773
Nondefense	39	889	973	812	609	278	337	220	166	698	5,021
Total	76	2,046	2,680	2,134	1,371	717	1,037	608	489	3,175	14,333
Per cent not reemployed	35.5	34.5	36.5	38.7	31.6	31.7	37.8	44.2	43.4	46.3	38.6
Per cent of those reemployed remaining in defense	20.4	33.7	42.9	38.0	35.1	43.3	47.8	33.9	40.1	59.0	42.9

Source: Defense sample.

3. Occupational Attachment and Occupational Mobility. Occupational mobility varies widely among occupational groups. Generally speaking those persons in occupations requiring fairly large amounts of specialized training or investment in education show particularly high occupational attachment or low occupational mobility.* It is also true that, for many of these workers, such as engineers, job opportunities within the occupation have been very good in recent years, so that their employment opportunities would be little if any improved by a willingness to consider jobs outside of the occupational category. It is not possible to say, therefore, that engineers are inherently highly immobile, because there has been little need for them to be mobile in recent years. Occupational attachment also requires other kinds of mobility as a consequence. Again the best examples of this are engineers who, in order to remain in engineering, are often willing to make major geographical and industrial shifts, or even to display considerable wage flexibility.

For a very large proportion of workers, however, occupational attachment will be sacrificed before the worker will be willing to move. This is explanable in terms of the relative smaller specific investment of these workers.

The occupational mobility arising from displacement in the defense sample bears out the expected pattern (Table IV-3). Seven-tenths of the reemployed professional and managerial employees were in professional, managerial, or technical occupations. The only other significant new occupation for these workers was skilled labor. No doubt many of these were nongraduate engineers who accepted downgrading. A similar pattern held for technical workers, but a smaller proportion of technical workers were reemployed, and fewer got professional, managerial, or technical jobs and larger proportions accepted downgrading.

Clerical workers showed the second highest proportion finding jobs in the same occupation group. Many of these workers were women.

About one-half of the reemployed skilled workers found skilled jobs, but one-sixth moved into semi-skilled jobs, while almost one-tenth moved into professional, managerial, or technical jobs. Smaller proportions of semi-skilled and unskilled workers found jobs in the same occupation, and upgrading was quite common for these groups.

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* The concepts of general and specific investment are discussed in Gary Becker, Human Capital, New York: National Bureau of Economic Research, 1964.

Table IV-3
Percentage Distribution of Pre-Displacement Occupation Groups by Reemployment Occupation

Occupation (if employed at time of survey)	Occupation before displacement: No response	Professional or managerial	Technical	Clerical	Agricultural or service	Skilled Labor	Semi-skilled labor	Unskilled labor	Total number
No response or unemployed	39.5	23.9	46.7	50.3	63.8	32.9	44.0	50.3	5,665
Professional, managerial, or technical	28.5	54.7	23.1	7.3	1.5	5.8	2.1	3.0	2,613
Clerical	9.3	11.3	17.7	29.6	3.4	7.1	6.9	4.2	1,908
Agricultural or service	2.7	1.4	2.1	3.4	18.5	3.7	4.9	5.4	528
Skilled labor	13.7	5.7	4.8	2.8	2.7	35.2	18.9	10.0	1,925
Semi-skilled labor	3.8	2.1	3.2	4.1	5.2	10.8	16.1	12.5	1,093
Unskilled labor	2.5	1.0	2.5	2.5	4.9	4.5	7.3	14.7	601
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Number	365	3,355	876	3,090	406	2,706	2,700	839	14,333
Percentage of reemployed in same occupation group	-	71.9	43.3	59.6	51.1	52.5	28.8	29.6	-

Source: Defense sample.

4. Geographical Mobility. Many American workers are willing to move for job opportunities, and, just as mobility allowed the workforces in aerospace concentrations to grow, so mobility would be needed if large numbers of aerospace workers were to be displaced. The behavior and attitudes of workers in the defense sample suggests that much of this mobility would be forthcoming. More than one-half of the respondents were willing to relocate for a job (Table IV-4), and about one-fifth of the respondents had moved (Table IV-5). The proportions moving and willing to relocate were higher in successive age groups (older than 25 years), bearing out the previously observed tendency of immobility to increase with age.

Willingness to relocate and actual moving showed similar variations among occupation groups. Professional and managerial workers, technical workers, and skilled labor were more mobile. These workers, of course, have large investments in occupational training. They are apparently willing to relocate in order to avoid occupational change. In each occupational group, however, at least one-fourth of the workers were willing to relocate and at least one-tenth of the workers had in fact moved (Table IV-6).

Table IV-4
Per Cent of Age Group Willing to Relocate

Will relocate	No response	Under 25	25-34	35-44	45-54	55 and over	Total (number)
No response	32.1	36.5	29.1	25.1	27.3	31.6	4,201
Willing	55.4	37.9	46.6	34.5	29.4	22.1	5,218
Unwilling	12.5	25.6	24.3	40.3	43.3	46.3	4,904
Total percent	100.0	100.0	100.0	100.0	100.0	100.0	-
Number	56	2,599	3,976	3,553	2,833	1,306	14,323

Table IV-5
Per Cent of Age Group that has Moved Since Layoff

Residence Status	No response	Under 25	25-34	35-44	45-54	55 and over	Total (number)
No response	1.8	1.2	1.5	2.2	4.8	6.7	393
Has moved	32.1	22.7	29.5	18.4	13.6	9.3	2,942
Has not moved	66.1	76.1	69.0	79.4	81.6	84.1	10,988
Total percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	56	2,599	3,976	3,553	2,833	1,306	14,323

Source: Defense sample.

Table IV-6
Per cent of Major Occupation Groups That Have Moved
or Are Willing to Relocate

Occupations before layoff	Per cent of those responding who have moved	Per cent willing to relocate
Professional or managerial	39.6	53.2
Technical	19.3	36.3
Clerical	14.4	27.9
Agricultural or service	12.3	29.1
Skilled labor	17.8	37.2
Semi-skilled labor	10.7	27.7
Unskilled labor	13.2	29.2

Source: Defense sample.

5. Withdrawal from the Labor Force. A response to displacement that is infrequently adopted by most workers is withdrawal from the labor force. For male workers aged 20 to 65, at least, work is the ordinary and customary activity. Few men have another source of income as an alternative to wages. Younger men may sometimes live with and on their parents, while most older men are eligible for at least small retirement pension from OASDI. As a last resort, aged men are in all states eligible for Old-Age Assistance under Federal-State welfare programs. For men in the working ages, then, withdrawal from the labor force will in most instances depend on the availability of an income alternative to wages, such as an early retirement pension or the income from accumulated wealth.

For displaced women workers withdrawal from the labor force is a common reaction. Most women workers who are older than 25 years are married, and married women are very often a secondary source of family income.* Such women can survive for extended periods without income because of the husbands' earnings. Moreover, many married women, especially those with children, have useful activities at home. For married women who must employ persons to care for children, displacement may not lead to a large reduction in spendable earnings, so that the economic pressure to find another job may be quite weak.

In most of the large-scale displacement situations studied by the National Planning Association relatively few workers withdrew from the labor force (Table IV-7). The most extreme example of labor force withdrawal was the Electric Auto-lite case in 1959. The unemployment rate of the displaced workers was 42 per cent after one year. Most significantly, the displaced group was largely made up of women.

The experience in defense industry displacements has been quite different. Fewer than 8 per cent of the displaced defense sample had withdrawn from the labor force by the time of the study. The withdrawal rates were highest for the oldest and youngest age groups (Table IV-1, above). A larger proportion of women than men withdrew from the labor force in the individual cases studied.

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* For an analysis of labor force patterns of women see Cain, G.G., Labor Force Participation of Married Women (Chicago: University of Chicago Press, 1966); Mincer, J., "Labor Force Participation of Married Women," in National Bureau of Economic Research, Aspects of Labor Economics, pp. 63-106; and Tella, A., "Labor Force Sensitivity to Employment by Age, Sex," Industrial Relations, February, 1965.

Table IV-7
Experience of Displaced Workers in Large-Scale Non-Defense Employment Cutbacks

Name	Year	Was the labor force disadvantaged[a]?	Did the firm have 10 percent or more of community employment?	Community unemploy rate	Period from shutdown to time of study
ABC Company		no	no	low	one year
Armour, Columbus		yes	no		one year
Armour, E. St. Louis		yes	no		one year
Armour, Oklahoma City		yes	no	low	18 mo.
Armour, West Fargo		yes	no	low	one year
Automotive equipment		yes	no	high	10 mo.
Floor covering		yes	no	low	16 mo.
Electric Auto-lite	1959	yes	yes	high	one year
Int'l Harvester, Auburn	1950	no	yes	no.	two years
Mack Truck, Plainfield	1961	yes	yes	low	10 mo.
Glass-jar Plant	1962	yes	no	high	8 mo.
Oil refinery	56-61	no	no	high	6-18 mo.
Packard, Detroit	1956	yes	no	high	two years
Pressed steel	1954	yes	yes	high	two years

Table IV-7 (continued)

Name	Year	Labor force status (per cent) at work	unemployed	out of labor force	Did the company have an Early retirement plan	Severance Pay
ABC Company		76	22	2	yes	yes
Armour, Columbus		63	32	5	yes	yes
Armour, E. St. Louis		33	60	7	yes	yes
Armour, Oklahoma City		70	20*	10	yes	yes
Armour, West Fargo		65	29	6	yes	yes
Automotive equipment		60	25	15	yes	yes
Floor covering		75	17	9	yes	yes
Electric Auto-lite	1959	39	42	19		yes
Int'l Harvester, Auburn	1950	88	7	5	no	no
Mack Truck, Plainfield	1961	64	23	13	yes	yes
Glass-jar Plant	1962	50	40	10	yes	yes
Oil refinery	56-61	83	8	9	yes	yes
Packard, Detroit	1956	44	51	5	no	no
Pressed steel	1954	79	12	9		

* has not worked since layoff and is still in the labor force.

Source: Derived from Community Adjustment to Reduced Defense Spending, Resume of Twenty Case Studies, Center for Economic Projections, National Planning Association for United States Arms Control and Disarmament Agency, Washington, D. C., December 1965 (mimeo).

Very few workers retire voluntarily. Usually retirement results from ill health, layoff, or involuntary imposition of retirement by employers. An extensive study of retirement by the Social Security Administration found:

--Few beneficiaries retired while in good health in order to enjoy leisure; most aged persons receiving benefits had been laid off by their employers or quit because of poor health.

--Most of the beneficiaries returned to work whenever they could get a job, usually because they needed the income. The relatively few beneficiaries who were in good health but not interested in working for the most part had adequate retirement incomes.

--The general labor market situation helped to explain variations among surveys in the employment rates of aged beneficiaries. As the national unemployment rate dropped, the employment of the beneficiaries rose; a rising unemployment rate had the opposite effect.

--In general, beneficiaries' employment rates decreased with age, but the health status of these men appeared to have had a greater effect on the employment rates than did age.

--The pre-entitlement occupation of beneficiaries had a direct bearing on their rate of employment. Between one-fourth and one-half of the beneficiaries employed during the various survey years had changed occupations and many of them had experience on occupational downgrading.

--Most of the men who worked during the various survey years were employed full time for only part of the year or worked on a part-time or irregular-day basis. For most beneficiaries employment was only a temporary means of supplementing retirement income.

--As a result of liberalizations in the retirement test, the proportion of employed beneficiaries who were subject to benefit suspensions because their earnings exceeded the permitted amount dropped from a high of 62 per cent in the 1949 survey to 39 per cent in the 1951 survey and to a low of 14 per cent in the 1957 survey.

--On the average earnings of those whose benefits were suspended were approximately six times the amount of the lost payments in the 1944 and 1946 survey years. They were about four times as great in the 1951 and 1957 surveys.

--A large majority of beneficiaries who were not employed during the final week of the various survey years said their health would not permit them to work at any kind of job. The solution to the income problem of these beneficiaries therefore was not work opportunities.*

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* Edna C. Wentworth, Employment After Retirement, Social Security Administration, Office of Research and Statistics, Research Report No. 21, Washington: U.S. Government Printing Office, 1968, pp. 28-29.

6. Wage Flexibility. Despite the importance of the question, there is little reliable information on the actual wage flexibility of unemployed workers. To economic theorists the question is of major importance, the unwillingness of workers to reduce wage demands and (sometimes) of employers to offer wages below current levels playing a central role in the possibility of an economy having large scale unemployment. It is necessary to distinguish between workers' expressed opinions and their actual behavior. Workers are usually adamant when asked about willingness to accept lower than customary wages, but, to the extent information is available, their actual flexibility may be somewhat greater.

Kasper shows there is a decrement of 0.375 percentage point in the ratio of asking wage to previous wage associated with an additional month of unemployment (or 4.5 percent per year).* Whether this is "flexible" or "inflexible" is a matter of taste.

An earlier study found that few unemployed workers express willingness to accept lower wages, and that the percentage willing to accept reductions increases only slowly with increasing duration of unemployment.** Sobel and Folk found that there is an increase in the proportion of unemployed workers willing to accept lower wages after the first month of unemployment, and again in each period after six months of unemployment.*** These results are similar to Kasper's findings which are in terms of percentage reduction in wages demanded. Sobel and Folk's data suggest that the expressed willingness to accept lower wages is a characteristic of only a fraction of the unemployed and the reduction in the average ratio of asking wage to previous wage results from the increased fraction of the unemployed who are willing to accept reductions of 10 percent or more from their previous wages. Both Kasper's and Sobel and Folk's studies may seriously understate the degree of downward wage flexibility and caution is advisable in interpreting the responses of unemployed workers relating to their wage demands.

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* Review of Economics and Statistics, Vol. XLIX, No. 2, May 1967, pp. 165-172.

** Irvin Sobel and Hugh Folk, "Labor Market Adjustments by Unemployed Older Workers," in Arthur M. Ross, Employment Policy and the Labor Market, Berkeley and Los Angeles: University of California, 1965, pp. 333-357.

***Op. cit., Table 11-17, p. 348.

Are unemployed workers with inflexible wage demands likely to experience longer periods of unemployment than those with more flexible demands? The apparent wage inflexibility of the long-term unemployed may simply result from the greater success of wage-flexible unemployed workers in finding jobs (a possibility suggested by Sobel and Folk* and by Charles C. Holt**).***

Some additional light may be thrown on the problem by examining the actual wages obtained by groups of reemployed defense workers. In each of the four studies cited a majority of the laid off workers had found new employment at the date of the study.

Of workers laid off as a result of the Dyna-Soar cancellation in December 1963 at the Boeing Company in Seattle, 57 per cent of the men and 82 per cent of the women were willing to accept lower wages and the proportions willing to accept lower wages increased with increasing duration of unemployment. By mid-August, 1964, the median wage of the reemployed men was $14 lower than the previous $513 median at Boeing, and for the women was $33 below the $406 previous median.****

A study of workers displaced by termination of F-105 production at Republic Aviation on Long Island showed that of those reemployed the median wage decreased from $524 at Republic to $454 for men and from $496 to $350 for women.*

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* Op. cit., fn. 4, p. 352.

** In Kasper, op. cit., fn. 12, p. 170.

*** It would be easy to design a study to choose between these alternatives, but it would have to be a longitudinal study of the wage demands and re-employment experience of a sample of displaced workers rather than a cross-sectional study of the opinions of unemployed workers. Kasper's examination of the wage demands of workers with inactive claims (most of whom were presumably reemployed) shows that these workers expressed somewhat greater flexibility, but the difference is not statistically significant at the conventionally desirable level.

**** A Case Study of the Effects of the Dyna-Soar Contract Cancellation Upon Employees of the Boeing Company in Seattle, Washington, United States Arms Control and Disarmament Agency Publication 29, Washington, D. C.: U.S. Government Printing Office, 1965, p. 90.

A study of major layoffs at Martin arising from phasing out of Titan II production showed that 28 percent of reemployed workers had salaries in the next lower $25 salary class and 26 percent were two or more salary classes lower.**

A study of laid off engineers and scientists in San Francisco showed that 27 percent experienced wage reductions on reemployment.***

These studies show degrees of downward wage flexibility of reemployed workers of a magnitude that is completely inconsistent with the wage flexibility expressed by unemployed workers in the Kasper and Sobel and Folk samples. Although the four reemployment studies are not completely representative of unemployed workers in general because they represent experiences of workers faced with mass layoffs in local labor markets, they appear to cast serious doubt on the picture of relative inflexibility shown in both the Kasper and the Sobel and Folk studies. A large proportion of some groups of laid off workers are apparently willing to adjust their wages downward, and many of these make substantial downward adjustments.

Of course, unemployed workers may simply be exaggerating their wage demands. Unemployed workers may in fact be willing to reduce their wage demands but unwilling to admit it. Before it is concluded that the wage-flexible tend to be reemployed while the wage-inflexible tend to remain unemployed it would be well to examine the relation of actual wages and wage demands to duration of unemployment for a sample of workers beginning at the time they become unemployed.

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* The Post Layoff Labor Market Experiences of the Former Republic Aviation Corporation (Long Island) Workers, United States Arms Control and Disarmament Agency Publication 35, Washington: U.S. Government Printing Office, 1966, p. 28.

** Reemployment Experiences of Martin Company Workers Released at Denver, Colorado, 1963-1964; Effects of Defense Employment Readjustments, United States Arms Control and Disarmament Agency Publication 36, Washington: U.S. Government Printing Office, 1966, p. V-2.

***R.P. Loomba, A Study of the Re-employment and Unemployment Experiences of Scientists and Engineers Laid Off from 62 Aerospace and Electronics Firms in the San Francisco Bay Area During 1963-65, Manpower Research Group, Center for Interdisciplinary Studies, San Jose State College, San Jose, California, February 1967. The percentage is derived from Table 52, p. 75.

When workers are reemployed their wages may increase or decrease (Table IV- 8). The pattern seems clear that, except for the very highest salary group, the proportion of workers reemployed by the time of the study is higher for high earnings groups than for low earnings groups. This experience no doubt reflects the higher skills and experience of workers which were still in demand during the period of these layoffs. As we suggest above, the opposite situation may well obtain in the event of a major arms cutback arising from a strategic vehicle freeze.

Salary change for occupation groups shows an odd pattern of gains and losses (Table IV- 9). Salary decreases were more frequent than increases for all occupation groups except unskilled labor, and were most frequent for professional and managerial workers and skilled labor. Salary increases were most frequent for these two groups also.

The reservation salary at the time of the survey showed a peculiar relationship to pre-displacement salary for those seeking jobs and growing reservation salaries. Almost all of those receiving pre-displacement salaries of $75 required higher pay, while very small proportions of those in the highest salary classes required salaries as high as they got before displacement (Table IV-10).

Table IV-8

Per Cent of Pre-Layoff Salary Classes in Post Layoff Salary Classes

Post Layoff Salary	No response	Less than 75	75-99	100-124	125-149	150-174	175-199	200-224	225-249	250-274	275-299	300 or more	Total
No response	49.6	40.0	54.2	43.6	35.4	32.7	33.0	28.3	32.6	30.2	18.0	44.4	6,102
less than 75	1.5	1.5	4.6	10.2	7.5	2.1	.8	1.6	1.0	-	-	-	831
75-99	15.5	3.1	25.7	21.6	11.4	7.9	5.3	5.1	1.1	1.0	-	-	2,515
100-124	9.8	20.0	7.7	19.7	19.4	13.4	8.2	6.3	.6	2.1	-	1.6	2,093
125-149	9.1	29.2	1.9	5.9	22.2	17.9	10.0	5.1	4.6	3.1	-	-	1,307
150-174	5.7	3.1	.2	1.2	7.3	18.8	15.6	8.5	8.0	4.2	6.0	1.6	669
175-199	4.9	-	.1	.3	1.0	7.1	13.0	10.2	10.3	5.2	10.0	-	307
200-224	2.3	-	.0	.3	.7	1.4	11.3	27.1	25.7	22.9	52.0	42.8	367
225-249	1.1	-	.0	.0	.2	-	.7	6.1	10.9	3.1	-	-	62
250-274	.4	-	-	-	.0	-	.7	.7	5.7	20.8	2.0	3.2	43
275-299	-	-	-	-	.0	-	-	.2	.6	5.2	4.0	1.6	11
300 or more	-	-	.0	.0	.2	-	.6	1.2	-	2.1	8.0	4.8	26
Total	264	65	3,429	5,300	2,563	1,219	699	410	175	96	50	63	14,333

Source: Defense sample.

Table IV-9
Per Cent of Pre-Layoff Salary Groups by Reservation Salary for Jobs in Immediate Locality

Weekly reservation salary for new job in immediate locality	Weekly Salary before layoff: No response	Less than $75	75-99	100-124	125-149	150-174	175-199	200-224	225-249	250-274	275-299	300 or more
No response	56.0	29.2	34.6	31.2	41.9	57.8	55.6	64.4	65.7	63.5	68.0	68.3
Less than $75	.4	1.5	18.6	4.2	1.1	.4	.1	-	.6	-	-	-
75-99	8.3	30.8	32.8	20.5	5.3	2.0	.9	.7	-	-	-	-
100-124	6.1	33.8	11.1	31.5	21.8	8.9	6.0	2.0	1.1	-	2.0	1.6
125-149	11.4	3.1	2.4	10.4	21.3	13.9	7.2	2.2	1.7	2.1	-	3.2
150-174	9.5	-	.2	1.7	7.0	12.9	15.2	6.6	5.7	4.2	-	1.6
175-199	3.8	-	.2	.2	1.1	2.5	8.9	10.7	5.1	-	2.0	1.6
200-224	1.1	-	.0	.1	.3	1.2	5.0	10.2	15.4	11.5	24.0	23.8
225-249	2.7	1.5	-	.0	.1	.1	1.1	3.2	3.4	12.5	2.0	-
250-274	-	-	-	-	.0	.1	-	-	1.1	3.1	-	-
275-299	-	-	-	-	-	.1	-	-	-	3.1	2.0	-
300 or more	.4	-	.2	.0	.0	.2	-	-	-	-	-	-
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number	264	65	3,429	5,300	2,563	1,219	699	410	175	96	50	63

Source: Defense sample.

Table IV-10
Number of Salary Classes of $25 Between Salary at Time of Survey and Pre-layoff Salary, by Major Occupation Group

Occupation Group	Per cent of total occupational group with number of salary change classes: Salary increases 2 or more	1	No change	Salary decreases 1	2 or more
Professional or managerial	2.4	10.6	21.9	15.5	16.0
Technical	1.6	3.5	18.0	15.2	8.3
Clerical	1.2	4.2	19.8	16.4	5.6
Agricultural or service	2.5	6.4	13.8	12.1	1.7
Skilled labor	2.8	5.9	22.6	20.7	12.6
Semi-skilled labor	2.0	5.9	20.5	18.4	8.9
Unskilled labor	3.1	9.5	22.1	11.7	.6

Source: Defense sample.

D. Worker Losses from Displacement.

In Chapter I we presented a brief theoretical framework for the analysis of the economic cost of displacement to the worker, the present values of the earnings lost during unemployment, the earnings differential on reemployment, less the offsets of unemployment benefits, severance pay, and deferred benefits. In this section we take up the question of worker loss of earnings during the period of unemployment following displacement. The question of change in earnings on reemployment was dealt with in a previous section, in which we concluded that young workers seldom suffer a significant permanent reduction in wages while the reductions in wages of older workers are likely to be somewhat more permanent. To calculate the worker's economic loss, the present value of deferred vested pension benefits of the worker would also be needed.

The losses from displacement as measured here is the difference between earnings that would have been received if the worker had continued at work in his predisplacement job and the offsetting unemployment benefits and severance pay. The loss from displacement is such that only an infinitesimal proportion of workers actually gained from displacement, and these were workers who found jobs quickly enough that their severance pay more than offset their wage loss.* The calculated loss varies widely among age groups (Table IV-11). One-half of the workers under 25 years old experienced a loss of $700 or less, while the corresponding figure for workers 55 years and older was $1,250. Losses of $3,000 or more were reported for about 7.5 per cent of workers 45 years and older while fewer than 3 per cent of workers under 35 years old had losses that large. The larger losses of the older workers arises primarily from the extended duration of unemployment experienced by these workers (Table IV-12). The association of greater losses with age suggests that in the sample, at least, the older workers are not compensated adequately for displacement by severance pay.

The relatively small losses experienced by many of the displaced workers and the relatively short duration of unemployment may be surprising in view of the great concern expressed over displacement. These data suggest quite strongly, we believe, that defense workers laid off in the 1962-1964 cutbacks suffered displacement losses that were quite small compared to those experienced by workers in civilian industry mass layoffs.

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* The number of gainers is somewhat smaller than might be expected on the basis of the number of workers who experienced no unemployment and the number receiving severance pay.

Table IV-11
Loss from Displacement, by Age
(Percentage distribution)

Gain or Loss	No response	Less than 25	25-34	35-44	45-54	55 and over	Total
Gain							
1,000 or more	----	.4	.4	.3	.1	.1	40
Loss							
0-450	14.3	23.8	17.5	12.8	9.4	6.9	2,091
500-950	7.1	26.0	21.7	19.2	18.3	18.0	2,923
1,000-1,450	7.1	14.1	16.2	17.0	18.5	19.5	2,358
1,500-1,950	8.9	5.3	8.5	10.9	12.7	13.7	1,384
2,000-2,450	7.1	2.7	4.3	6.4	7.0	6.0	732
2,500-2,950	----	1.3	2.6	3.1	3.5	2.6	374
3,000 and over	----	.8	2.2	4.3	5.0	4.5	448
No response or insufficient information	53.6	21.9	22.6	22.8	23.5	26.4	
Total	100.0	100.0	100.0	100.0	100.0	100.0	
Number	56	2,557	3,899	3,480	2,798	1,293	14,083
Median loss for those reporting[a]	$1,050	$700	$850	$1,000	$1,200	$1,250	-----

a. Interpolated.

Source: Defense sample.

Table IV-12
Duration of Unemployment to First Job by Age
(Percentage distribution)

Weeks unemployed	No response	Age in years: Under 25	25-34	35-44	45-54	55 and older	Total number
0	5.4	30.7	22.7	23.1	28.7	38.9	3,841
1-5	23.2	27.2	26.7	19.5	14.8	10.5	3,031
6-13	19.6	19.5	24.8	20.5	16.3	8.0	2,800
14-26	14.3	9.0	9.1	12.2	11.9	8.7	1,485
27-39	.0	2.3	2.4	4.7	4.5	3.3	492
40-52	.0	.9	.7	1.0	1.0	1.0	127
Over 52	.0	.1	.3	.3	.2	.2	35
Continuously unemployed or no response	37.5	10.4	13.4	18.7	22.7	29.5	2,512
Total	100.0	100.0	100.0	100.0	100.0	100.0	
Number	56	2,599	3,976	3,553	2,833	1,306	14,323

Source: Defense sample.

This was because they occurred during periods when unemployment was falling and defense demand remained high.

It is questionable, however, that this experience adequately foreshadows the experience of workers laid off as the result of an arms cutback of substantial magnitude. The average duration of unemployment could be expected to rise sharply, and the proportion of workers experiencing some unemployment would also increase. Workers would be forced to make more radical adjustments, and reemployment wage differentials could be expected to increase. Thus losses would likely be considerably larger than those experienced in these earlier cutbacks.

E. Displacement and Reemployment of Engineers.

1. Engineering Unemployment. Few professional workers face unemployment during their careers, but engineers are different. A large scale cutback in strategic defense means that many engineers and industrial scientists will experience at least brief periods of unemployment between jobs and some may experience lengthy periods of unemployment.

When the cutbacks occur employers will usually have an option to pick over their technical staffs and to retain the best engineers and scientists, at least in some specialties. It seems likely that the technical workers who are laid off are not as good, on the average, as those who are retained.

Once laid off, the engineers and scientists often face a difficult choice of moving out of their specialties and remaining in their communities, or changing residence if they find employment with a successful contractor. As the worker ages he is less likely to change location and more likely to change specialty or even move out of science and engineering altogether.

This problem is particularly severe in markets dominated by a single employer. When the Dyna-Soar contract was cancelled at Boeing in Seattle and Titan production ended at Martin in Denver the laid off engineers and scientists had the choice of leaving the aerospace industry or leaving town. Both of these projects employed large proportions of engineers, and their cancellation probably resulted in a reduction of the number of working engineers because some of them left engineering altogether. In contrast to this experience were the layoffs resulting from the termination of F-105 production at Republic on Long Island. At the time these layoffs were occurring Grumman was expanding employment, so that aircraft employment remained steady over the period on Long Island. Despite this offset there was much movement out of the industry by experienced defense workers. Relatively few engineers were involved in this cutback, but there was an obvious loss of technical skills in the movement of these experienced aircraft workers out of the industry.

The unemployment experience of displaced engineers and scientists is similar to general unemployment experience. Many engineers with inadequate education either must accept downgrading to nonprofessional or semi-professional jobs or experience extended unemployment.*

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* See, for instance, Joseph D. Mooney, "An Analysis of Unemployment Among Professional Engineers and Scientists," Industrial and Labor Relations Review, Vol. 19, No. 4, July 1966, pp. 523-525.

Such workers make up a substantial fraction of the unemployed engineers registered at public employment offices. The average duration of unemployment and difficulties in finding jobs also increase with age, as is true of workers in general.*

Unemployment rates for engineers and scientists are not available except in census years, but were 1.8 per cent in 1950 and 1.2 per cent in 1960 indicative of relative unemployment rates in most years. Engineers and scientists have lower unemployment rates than all male workers (4.9 per cent in 1950 and 4.0 per cent in 1960) or all male professional and technical workers (1.8 per cent in 1950 and 1.4 per cent in 1960), but their rates are somewhat higher than those for other professions.

2. Capacity of the Economy to Absorb Laid Off Engineers. The capacity of the economy to absorb laid off defense engineers was tested in defense layoffs in 1963 and 1964. The experience of convertibility is reviewed below, and it is concluded that, on the whole, defense engineers have little trouble in finding good jobs in civilian industry. Because few engineers relative to increased demands were laid off in this earlier period, there was no glut problem. In the event of a major arms cutback, such as the one assumed in this study, the problem might be very different.

The market for engineers is growing secularly. In few recent years has demand growth fallen below 6 or 7 per cent (Table IV-13). The estimated growth of supply is much less rapid (Table IV-14). Thus in the past there has been in most years an excess of demand over supply, and this has led to an increase of earnings of engineers relative to other occupations and employers bid up salaries. Another result of the excess demand for engineers has been a decline in the ratio of engineers to total employment in a large number of industries, especially civilian industries. This suggests that there is a considerable capacity for substitution of engineers for nonengineers in civilian industry, but only on the assumption that the relative salaries of engineers declined compared to other groups of workers.

Forecasts of engineering demand suggest that demand will continue to outstrip supply (see Table IV-15). These forecasts are based on rather mechanical forecasts of engineer to total employment ratios and on

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* Ibid. p. 521, and also see R. P. Loomba, A Study of the Re-Employment and Unemployment Experiences of Scientists and Engineers Laid Off from 62 Aerospace and Electronics Firms in the San Francisco Bay Area During 1963 Manpower Research Group, Center of Interdisciplinary Studies, San Jose State College, San Jose, California, February, 1967.

Table IV-13
Indirect Estimate of Annual Engineering Requirements

Year	% change in R&D over previous year[a]	% change in GNP less R&L over previous year	Per cent of engineers R&D[b]	Per cent of engineers Non-R&D[b]	Per cent change in requirements[c]
1950	17.1	11.0	22	78	12.3
1951	11.6	15.4	23	77	14.5
1952	6.7	5.2	24	76	5.5
1953	3.5	5.5	25	75	5.0
1954	9.7	-0.1	26	74	2.5
1955	9.5	9.1	27	73	9.2
1956	35.0	4.8	28	72	13.3
1957	17.2	5.0	30	70	8.6
1958	10.2	1.2	31	69	4.0
1959	15.0	7.9	32	68	10.2
1960	9.6	4.0	33	67	5.9
1961	5.6	3.2	34	66	4.0
1962	8.6	7.7	35	65	8.0
1963	11.1	5.0	36	64	7.2

a. Derived from NSF R & D data.

b. Estimated.

c. Estimated by weighting percentage changes in R & D spending and GNP less R & D by the percentages of engineers in the two categories and summing the two products.

If D_t = per cent change in requirements.

$\Delta(R \& D)_t$ = change in R & D spending from year t-1 to year t.

$(R \& D)_{t-1}$ = R & D spending in year t-1.

$\Delta(GNP - R \& D)_t$ = change in GNP less R&D spending from year t-1 to year t.

$(GNP - R \& D)_{t-1}$ = GNP less R & D spending in year t-1.

α_t = proportion of engineers and scientists employed in R & D.

then

$$D_t = \left[\frac{\Delta(R \& D)_t}{(R \& D)_{t-1}}\right] \alpha_t + \left[\frac{\Delta(GNP - R \& D)_t}{(GNP - R \& D)_{t-1}}\right] (1 - \alpha_t)$$

Source: Hugh Folk, The Shortage of Scientists and Engineers, Department of Economics (Washington University, St. Louis, 1968), p. 73.

Table IV-14
Estimated Net Rate of Growth of Supply of Graduate Engineers, 1950-64

Year	Number of graduate engineers[a] (March 1)	Gross additions of graduates[b]	Net rate of growth[c] (percent)
1950	281,670	43,218	13.2
1951	317,789	37,190	9.5
1952	347,223	29,741	6.4
1953	368,727	25,200	4.7
1954	385,320	22,010	3.6
1955	398,430	21,314	3.2
1956	410,573	22,967	3.4
1957	424,067	26,551	4.1
1958	440,772	30,106	4.7
1959	460,589	32,917	5.0
1960	482,729	33,403	4.8
1961	504,855	32,468	4.3
1962	525,582	31,768	3.9
1963	545,172	30,708	3.3
1964	563,297	32,026	3.5
1965	582,315	NA	NA

a. 1950 and 1960 from Census of Population. Other years estimated by assuming 2.155 percent per year attrition rate from the stock plus the gross addition in each year.

b. Estimated by subtracting the estimated attrition rate (2.155 percent) from the gross rate of growth (gross additions divided by the number of engineers expressed as a percent).

Source: Hugh Folk, The Shortage of Scientists and Engineers, Department of Economics, Working Paper No. 6802, Washington University, St. Louis, 1968, p. 187.

Table IV-15
Long-Range Forecasts of Percentage Increases in Engineering Requirements and Supply

	Requirements:		
Projection	Period	Engineers	Supply
Engineering Manpower Commission			
A. 1962	1961-71	45[a]	
B. 1964	1963-73	26[a]	
National Planning Association			
A. (To maintain growth) 1964	1960-70	60	
B. (For goals) 1964	1960-70	78	
Bureau of Labor Statistics			
A. 1961	1959-70	90	
B. 1963	1960-70	67	34
C. 1966	1960-70		38
Folk	1960-70		48

a. Industry and government only.

Sources:
EMC-1962, 1964: Engineering Manpower Commission of Engineers Joint Council, *Demand for Engineers, Physical Scientists, and Technicians--1964*, New York, Engineering Manpower Commission of Engineers Joint Council, 1964.

NPA: Gerhard Colm and Leonard A. Lecht, "Requirements for Scientific and Engineering Manpower in the 1970's," Committee on Utilization of Scientific and Engineering Manpower, *Toward Better Utilization of Scientific and Engineering Talent: A Program for Action*, Washington: National Academy of Sciences (Publication No. 1191), 1964, Appendix Table B, p. 7.

BLS-1961: Bureau of Labor Statistics, *The Long-Range Demand for Scientific and Technical Personnel--A Methodogical Study*, National Science Foundation, NSF 61-65, 1961.

BLS-1963: Bureau of Labor Statistics, *Scientists, Engineers, and Technicians in the 1960's: Requirements and Supply*, National Science Foundation, NSF 63-34, 1963.

BLS-1966: Neal Rosenthal, "Projections of Manpower Supply in a Specific Occupation," Monthly Labor Review, November, 1966, p. 1266.

Folk: Hugh Folk, *The Shortage of Scientists and Engineers*, p. 344.

forecasts of industry total employment that do not assume arms cutbacks. If the forecasts were adjusted to take account of a substantial reduction in aerospace employment and a slowdown in the growth of electronics employment a considerable reduction in forecast engineering demand would occur because both of these industries have high ratios of engineers to total employment. The demand forecast made by employers in 1963 (EMC-1964 in Table IV-15) during a period of defense cutbacks shows a modest 26 per cent increase for the decade, somewhat less than the small forecast decade increase in supply.

The estimated number of engineers displaced by the assumed arms cutback is about two years gross additions to graduate supply. There has been no year since 1954 in which the growth of supply exceeded the growth of requirements by as much as one percentage point. In our hypothetical arms cutback year requirements would decrease by perhaps 6 per cent, while supply had an increase of about 3 per cent. Changes of this order suggest a very serious disorder in the engineering labor market arising from the sheer number of engineers released. This suggests it would be unwise to consider previous experience of engineers during smaller cutbacks as reliable estimates of experience in a major cutback.

3. Convertability of Defense Engineers to Nondefense Employment. In addition to the problems of numbers, the experience of defense engineers may not suit them for easy transition to civilian work. Three studies have been devoted to the problem. Norgren and Warner found that engineers in defense firms were somewhat younger than those in nondefense firms. They estimated that 45 per cent of the engineers in defense-oriented firms and 55 per cent of those in predominantly non-defense firms were 35 years and older.* They also found that firms experienced an extended period of training on the job before a young engineer began to "earn" his salary, but that, in most instances, engineers identified by employers as skill-deficient or obsolescent were largely in the middle and upper ages. They found in defense layoffs that technical supervisors, on whom the decision to keep or to layoff workers fell, tended to weed out the least effective engineers. Layoffs tended to be concentrated disproportionately among the younger, more recently graduated engineers but some companies displaced many long-service non-degree engineers. Norgren and Warner also found expressions of the commonly held view that defense engineers were over-specialized and overpaid.

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* Paul H. Norgren and Aaron W. Warner, Obsolescence and Updating of Engineers' and Scientists' Skills, Seminar on Technology and Social Change, Columbia University, New York, 1966.

One study found that engineers believed lack of cost-consciousness, attitudes of commercial engineering managers, and different specialty requirements were obstacles to transfer to commercial engineering.* Those engineers who had experienced transfers, however, generally believed defense to commercial transfers to be rather easy. Managers were generally optimistic about transferability from the point of view of skills and attitudes, but were less optimistic about the capacity of commercial industry to absorb large numbers of defense employees. There was general agreement that where retraining was required it should be in-house. Some specialty problems were identified, such as a probably excess of documentation and aeronautical engineers. Formal training programs may be necessary for these groups.

Shapero, Howell, and Tombaugh in another study concluded that:

> . . .top management personnel of some of the composite companies indicated that they perceive the defense R & D scientist and engineer as being high-performance-oriented, while nondefense industry requires a cost-orientation. Almost unanimously they expressed the opinion that they would not transfer their defense researchers to commercial work (and have not transferred them in the past). None of them appeared to focus on the difference in salaries between defense and nondefense R & D work as a barrier, though this may be a barrier in other types of companies and industries.**

The reluctance of these employers to shift their own engineers to commercial work contrasts strongly with the experience of laid-off defense engineers. Mooney found that those laid-off defense engineers in his sample of 290 Boston area engineers who went to work in commercial jobs were generally older, less skilled, less educated, lower salaried, and less specialized than those who remained in defense work.*** Nevertheless, only five per cent of the commercial engineers underwent retraining. Of those entering commercial work, 24 per cent had lower salaries than before layoff while 41 per cent had higher salaries. Loomba found similar results for his sample of laid-off defense engineers and scientists in the San Francisco Bay Area, except that those who shifted to non-defense work were younger on the average than those who did not shift.* About 54 per cent of his sample found non-defense jobs.

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* The Transferability and Retraining of Defense Engineers (Washington: U.S. Arms Control and Disarmament Agency, November, 1967).

** Albert Shapero, Richard P. Howell, and James R. Tombaugh, An Exploratory Study of the Structure and Dynamics of the R&D Industry, R&D Studies Series, Menlo Park: Stanford Research Institute, June, 1964.

*** J.D. Mooney, "Displaced Engineers and Scientists: An Analysis of the Labor Market Adjustment of Professional Personnel," Unpublished doctoral thesis, Massachusetts Institute of Technology, 1966.

Since the relatively less well-paid and less well-qualified job changers tended to make successful switches to commercial activities in both these samples, it seems reasonable to conclude that if the relatively better qualified defense engineers needed to make switches to commercial activities they would be able to, always assuming job openings were available. Employer reluctance to switch their own engineers to commercial activities within the firm is not supported by a similar reluctance of commercial employers to refuse to hire ex-defense engineers. Nevertheless, Mooney found that 91 per cent of those reemployed in defense work preferred commercial work,** and this suggests that some defense engineers could not find suitable commercial jobs or were not acceptable for commercial jobs they wanted.

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* R.P. Loomba, A Study of the Re-employment and Unemployment Experiences of Scientists and Engineers Laid-off from 62 Aerospace and Electronics Firms in the San Francisco Bay Area During 1963-65, Manpower Research Group, Center for Interdisciplinary Studies, San Jose State College, California, February, 1967.

**Mooney, op. cit.

V. ROLE OF PENSIONS AND OTHER BENEFITS IN FACILITATING ADJUSTMENT

A Introduction.

As a result of large scale employment cutbacks significant actuarial gains in pension plans will be experienced by companies. Under ASPR, this actuarial gain can be disallowed as a cost, or companies may provide additional benefits by modifying the plans, in effect through partial termination. This protection would in most instances protect only small amounts of deferred retirement benefits and would therefore be of little assistance in facilitating adjustment for most workers. Plans could legally be modified to benefit especially disadvantaged workers (such as older workers) required to retire for the convenience of the company. Such provisions already exist in some pension plans.

Even if measures could be adopted providing generous early retirement benefits, it is not clear that early retirement would be a desirable course of action either for workers or from the point of view of the public.

Before considering the specific problems arising from pensions, we examine supplemental unemployment benefit plans and severance pay plans. These plans provide significant benefits ranging from a few hundred to several thousand dollars. These benefits can be of major importance to workers experiencing layoffs of up to a year, but, as we found in Chapter IV they infrequently go very far (even when unemployment insurance is considered) toward replacing lost income for those suffering lengthy unemployment. Nearly all workers unemployed longer than a year will have exhausted all company and state sources other than public relief, unless they are eligible for retirement.

In considering the pensions of workers eligible for retirement we first examine the effects of employment cutbacks on the pension funds themselves (Section D), then the suitability of early retirement for work force adjustment (Section E), the provision of full benefits for early retirees (Section F), the desirability of federal provision for early retirement (Section G), and the protection of worker pension rights in the event of a large scale cutback (Section H, I and J).

B. Supplemental Unemployment Benefits.

The supplemental unemployment benefit plans (SUB) are outgrowths of the United Autoworkers (UAW) drive for a guaranteed annual wage during the early 1950's. The June, 1955 Ford-UAW agreement establishing a SUB plan was the first major plan supplementing Federal-State unemployment compensation (UC). The Bureau of Labor Statistics has identified five "patterns" of SUB plans* as of 1964 (see Tables V-1 and V-2). The Ford-UAW plan as modified in 1967 is perhaps the most satisfactory plan from the workers' point of view.

In the 1967 SUB agreement the laid-off hourly worker with at least one year of seniority receives from SUB and UC 62 per cent of his weekly after tax straight time pay. The maximum weekly supplement for an individual is $70 plus $1.50 for each of his dependents up to four. The worker receives ½ credit unit for each week of work. Credit units are exchanged for benefits according to Table V-3. The credit unit cancellation base (CUCB) is the average amount in fund per covered worker. Thus the worker uses up at least one credit unit per week of benefit drawn. When the fund is below the maximum more units of credit are used for each week's benefit drawn, but the high seniority worker has a lower rate of unit usage than low seniority workers.

Ford's liability is limited to contractual contributions to a Trust Fund. When the fund is below contractual maximum funding levels the company contributes between 5 and 7 cents per hour of work until the Fund regains maximum funding level.

The Ford SUB system is clearly favorable for the high seniority workers who have accumulated large numbers of credit units. With the protection against layoff provided by seniority the older worker is doubly protected.

The Douglas Aircraft Company (now part of McDonnell-Douglas Corporation) and the UAW (effective in 1965) and the Vertol Division of the Boeing Company and the UAW have SUB agreements (effective in 1967), but such benefits have not spread to other aerospace firms which have extended layoff benefit plans. These are similar to the auto pattern plan, but the combined SUB and UI payments equal 65 per cent of weekly straight-time weekly earnings subject to a maximum of $55 a week in SUB alone.

The Douglas-UAW plan is financed by a company contribution of 5¢ per hour worked by covered employees.

The Douglas worker with one or more years of seniority earns a credit unit for each week worked after October 4, 1965 plus some units for earlier work, up to a maximum of 52 units. Each week a SUB benefit is received one or more credit units are used up. The credit unit cancellation rate is directly related to the average amount in the fund per

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* Bureau of Labor Statistics, Supplemental Unemployment Benefit Plans and Wage-Employment Guarantees, Bulletin No. 1425-3, (Washington: U.S. Government Printing Office, 1965).

Table V-1
Financial Characteristics of Five Pattern SUB Plans, 1964

	Contribution rate maximum cents per hour	Fund	Minimum fund level depends on	Maximum fund based on
Ford Motor Co. -UAW	5	Pooled[a]	number of employees, wages[c]	average benefit[h]
Goodyear Tire and Rubber Co.-URWA	4	Pooled[a]	number of employees,[c] assets[f]	base assets[i]
Ideal Cement Co. -CLGW	7	Pooled[a]	number of employees,[c] assets[f]	base assets[j]
Pittsburgh Plate Glass Co.-UGCW	10	Individual[b]	individual account[d]	$600 per worker[l]
U.S. Steel Corporation-U	9½	Pooled[a]	number of employees,[c] hours, benefits[g]	hours[k,m]

a. Contributions placed in a company fund established in accordance with a clause similar to the one in the U.S. Steel-USA plan: "There shall be one trust fund under the plan applicable to all employees covered by the plan, and any determinations under the plan will be based on the experience with respect to everyone covered thereby."

b. "...the company will enter into an agreement with a trustee or trustees selected by it, establishing a separate trust (referred to herein as the employee's "security benefit account") for each eligible employee of the bargaining unit...the company will contribute to each employee's security benefit account....

c. determined by financial status of funds. Contributions whenever fund is below specified level. Level related to number of covered active and laid-off employees.

d. related to size of each employee's account.

e. contribution also considers average weekly benefit amount.

f. contribution also considers assets per worker once minimum level is determined.

g. contribution also considers number of hours worked in previous year and amount of benefits paid in the previous full year.

h. 16 times the product of the average full benefit rate and the total number of covered active and laid-off workers with credit units.

i. $185.185 times number of active and laid-off workers.

j. $225 times number of active and laid-off workers with credit units.

k. 12.5¢ times number of hours worked by covered employees in first 12 of last 14 months.

l. excess paid as additional vacation pay.

m. excess to savings and vacation plan.

Source: Derived from U.S. Bureau of Labor Statistics, Supplemental Unemployment Benefit Plans and Wage-Employment Guarantees, Bulletin No. 1425-3, Washington: Government Printing Office, 1965.

Table V-2
Benefits Under SUB Pattern Plans, 1964

	Type of unemployment benefit	Other benefits	Required prior years of service	Benefit & UI amount as per cent of weekly straight-time pay	Maximum weekly benefit	Maximum duration in weeks
Ford-UAW	Regular or partial[a]	health insurance relocation allowance	1	62[c,f]	$40	52
Goodyear-URW	regular or partial[a]		1	62[c,g]	$40[g]	39
Ideal-CLGW	regular or partial[b]	occupational temporary disability	1	60[d,h]	$40	52
Pittsburgh-UGCW	regular[c]	death	1	10% of individual fund	$30	40[j]
U.S.Steel-USA	regular or partial[b]	all temporary disability; relocation	2	60[d,f]	$37.50[i]	52

a. Does not depend on receipt of UI benefit.

b. Special benefit depends on receipt of Federal-State UI benefit.

c. 62% of weekly straight-time pay.

d. 24 X average straight-time hourly pay.

e. But at least $15.

f. Plus dependents' benefits of $1.50 per week per dependent to a maximum of four persons.

g. Plus dependents' benefits of $2 per week per dependent to a maximum of four persons. Benefit maximum of $40 plus $2 times number of dependents to a maximum of four.

h. Additional benefit of hourly rate for one dependent and 2 times hourly rate for two or more dependents.

i. $60 a week after exhaustion of UI benefits.

j. At $15 weekly minimum benefit.

Source: Derived from U.S. Bureau of Labor Statistics, Supplemental Unemployment Benefit Plans and Wage-Employment Guarantees, Bulletin No. 1425-3, Washington: Government Printing Office, 1965.

Table V-3
Ford SUB Plan

If the Credit Unit Cancellation Base Applicable to the week for which such Benefit paid is:	and if the Seniority of the person to whom such Benefit is paid is					
	1 to 5 Years	5 to 10 Years	10 to 15 Years	15 to 20	20 to 25	25 Years and over
	The Credit Units Cancelled for such Benefit Shall be:					
$382.00 or more	1.00	1.00	1.00	1.00	1.00	1.00
342.00-$382.49	1.11	1.00	1.00	1.00	1.00	1.00
301.50- 341.99	1.25	1.11	1.00	1.00	1.00	1.00
261.00- 301.49	1.43	1.25	1.11	1.00	1.00	1.00
220.50- 260.99	1.67	1.43	1.25	1.11	1.00	1.00
180.00- 220.49	2.00	1.67	1.43	1.25	1.11	1.00
139.50- 179.99	2.50	2.00	1.67	1.43	1.25	1.11
99.00- 139.49	3.33	2.50	2.00	1.67	1.43	1.25
58.50- 98.99	5.00	3.33	2.50	2.00	1.67	1.43
18.00- 58.49	10.00	5.00	3.33	2.50	2.00	1.67
Under $18.00			No Benefit Payable			

Credit Units are exchanged for Regular Benefits on the basis of the Credit Unit Cancellation Base and seniority as shown above. For example: when the base is $382.00 or more, all employees would exchange one Credit Unit for each week of benefits. When the base is $180.00, an employee with 25 years' seniority would exchange one Credit Unit for each week of benefits, while an employee with three years' seniority would exchange two Credit Units for each week of benefits. You may receive benefits until your Credit Units are exhausted. If you do not have enough Credit Units for a full benefit, you will receive a full benefit and all your remaining Credit Units or fractions of Credit Units will be cancelled.

Source: Agreement between the Ford Motor Company-UAW, 1967, p. 31.

covered worker (CUCB) and inversely related to the worker's seniority, but on a slightly different scale (as in the Ford-UAW pattern plan, above Table V-3). Thus the SUB plan provides greater security for the high seniority worker when the fund is under pressure owing, for instance, to large scale layoffs.

C. Severance Pay.

Some provision for severance pay is provided in most collective contracts and a majority of included workers are eligible for such benefits (Table V-4). Incidence of plans differs with industry. Nearly all aerospace workers are employed by large firms but exact data have not been gathered.

In many companies without formal severance pay plans, severance payments may be made, either unilaterally or as a result of ad hoc collective bargaining with the union.

Plans differ considerably. Severance pay provisions are provided for in most SUB plans, and these are treated here rather than with the layoff provisions of SUB plans. The traditional severance pay plan provides a money payment, in a lump sum or installments to terminated workers. Thus the traditional plan contrasts sharply with SUB plans which are aimed primarily at interrupted employment. A combination of the two approaches is found in the extended layoff benefit plans (ELB) common in the aerospace industry. These are treated in this section.

Severance pay is infrequently paid to voluntarily separated or to discharged workers. One advantage of this in plant shutdown operations is to hold the worker until separated and thereby provide for orderly and efficient shutdown. The rationale, of course, is clear, that severance pay is paid to workers who are terminated for reasons beyond their control.

Entitlement to severance pay is sometimes denied to those workers who refuse unreasonably to transfer to other work, but what is reasonable depends on particular contracts. Minimum length of service requirements ranging from 6 months to 3 years are common in most plans. One year is the most common provision.

Acceptance of severance pay usually ends any recall rights, but workers sometimes have the option of delaying receipt of severance pay for a period of time (up to one year) and retaining seniority rights. Since almost one-half of the States disqualify the worker from unemployment insurance to the extent of his severance pay, delay of receipt of severance pay is often desirable for the worker..

Table V-4
Severance Pay and Layoff Benefits in Major Collective Bargaining Agreements, Selected Industries, 1963
(workers in thousands)

Industry	Total Number of Agreements		With severance pay and Layoff Benefits		With severance pay and layoff benefits as per cent of total	
	Agreements	Workers	Agreements	Workers	Agreements	Workers
Total	1,023	4,137.1	377	2,332.0	36.9	56.4
Ordnance	19	78.3	11	49.1	57.9	62.7
Chemicals & allied	61	112.7	36	63.7	59.0	56.5
Fabricated metal	57	141.7	17	69.1	29.8	48.8
Machinery, except electrical	98	262.7	25	124.6	25.5	47.4
Electrical machinery	98	396.9	37	222.6	37.8	56.1
Transportation equipment	121	975.5	52	697.9	43.0	71.5
Instruments & related	22	45.4	10	17.4	45.5	38.3

Source: Derived from BLS, Severance Pay and Layoff Benefit Plans, p. 13.

It seems clear that SUB, ELB, and SP would play a much larger role in providing income security for displaced defense workers than pensions. The workers who are old enough and have enough seniority to be eligible for significant pension benefits but are not eligible for immediate early retirement usually are eligible for substantial SUB, ELB, and SP benefits, in the larger firms at least. Our analysis of these supplemental benefits shows that they are often quite large and could provide for extended periods of unemployment if the funds were available, but, too often, severance pay benefits are not so available. In some instances severance pay does not add to the workers' income because he is disqualified for unemployment benefits. Where state laws are so written one can hardly expect much enthusiasm for negotiated severance pay benefits. Plans are usually written to avoid such effects. Thus a worker can often delay applying for severance pay until his UI eligibility is exhausted.

The principle similarities between SUB, extended layoff benefits, and severance pay are these:

1) All three benefits are intended to benefit workers during extended unemployment.

2) Benefits are usually related to wages or length of service, or both.

The distinguishing features of SUB is its dependence on continuation of unemployment by workers who may or may not be separated. SUB plans are also funded. The characteristic feature of severance pay is that the workers are permanently separated from employment, payment is a lump-sum, and workers need not be unemployed. Extended layoff benefits partake of features of both: they are funded, supplement unemployment insurance, are lump-sum, and do not depend upon the worker remaining unemployed beyond a qualifying period of unemployment.

1. Extended Layoff Benefits. Aerospace unions have generally sought SUB benefits, but extended layoff benefits (ELB) emerged in 1960 contracts in most companies.

Unions view ELB plans as unsatisfactory substitutes for SUB plans, and it is to be expected that they will in time be replaced by SUB plans. Like SUB plans, ELB plans are funded. In a typical plan, that between the Aerojet-General and the International Association of Machinists, benefits are as follows. Workers with four or more years of qualifying service laid off for reduction of force for four weeks may receive on application a benefit of $50 for each full year of service, subject to a maximum of $500. The worker can draw benefit only once on the same year of qualifying service.

The company's monthly liability is equal to $5.20 per covered employee on active payroll at first Monday of month, such to a maximum of $150.00 per worker. If the fund is below $50 per employee the worker's benefit is reduced.

2. Separation Benefits under SUB. Separation benefits in the Douglas-UAW and Vertol-UAW plans are based on seniority (Table V-5). The number of hours is multiplied by the hourly rate. The separation benefit is payable after a worker has been laid off 12 months but not more than 24 months. Receipt of the separation benefit breaks seniority. Following the Douglas-UAW plan if the worker's credit unit cancellation base (CUCB) is below $160 the separation payment is reduced 1 per cent for each $1.60 by which the CUCB is below $160. Any separation payment is reduced by the amount of any weekly SUB payments received after the last day worked or by other company separation benefits. Workers eligible for a company retirement pension (except a deferred pension) are not eligible for separation payments.

Two examples of the Douglas-UAW separation payment are: Example "A"-A worker is on layoff for 12 months and during this period received $325 in weekly SUB. He had 8½ years of Seniority when laid off and a Base Hourly Rate of $3.10. The CUCB when he applied for a Separation Payment was above $160.

$3.10 x 300 hours (per Table)	$930
Less SUB received	325

Table V-5
Douglas-UAW Separation Payment Table

Gross Period of Service in Years On Last Day On The Active Employment Roll	Number of Hours' Pay
1 but less than 2	50
2 but less than 3	70
3 but less than 4	100
4 but less than 5	135
5 but less than 6	170
6 but less than 7	210
7 but less than 8	255
8 but less than 9	300
9 but less than 10	350
10 but less than 11	400
11 but less than 12	455
12 but less than 13	510
13 but less than 14	570
14 but less than 15	630
15 but less than 16	700
16 but less than 17	770
17 but less than 18	840
18 but less than 19	920
19 but less than 20	1000
20 but less than 21	1085
21 but less than 22	1170
22 but less than 23	1260
23 but less than 24	1355
24 but less than 25	1455
25 but less than 26	1560
26 but less than 27	1665
27 but less than 28	1770
28 but less than 29	1875
29 but less than 30	1980
30 and over	2080

Source: Douglas Aircraft Company, SUB in Brief.

Separation Payment $605

Example "B" - Same as "A" except that his Seniority was longer -15 years -and the CUCB when he applied was $140.80 ($19.20 below $160).

$3.10 x 700 hours (per Table)	$2,170.00
Less SUB received	325.00
	$1,845.00
Less 12% because of CUCB	221.40
Separation Payment	$1,624.60

In addition the worker in Example B would be eligible to a deferred pension benefit.

3. Savings Plans. In addition to other benefit plans, some companies have savings or stock purchase plans in which the employee's contributions are partially matched by company contributions. For instance, in the Lockheed hourly employees plan the worker can contribute $2 or $4 a week during the first two years of employment and up to $6 thereafter. The salaried employee's plan allows 2, 4, or 6 per cent of weekly compensation. The company matches 50 per cent of the savings. These funds may be all or half in a securities or a bond fund. An hourly worker with 10 years seniority might have $5,000 or more in such a fund, a third of which arises from company contributions.

The employee's contributions to the fund are always available to him, but the company's contribution is available in full only on the worker's

(a) Retirement under company retirement plan.
(b) Entrance to Armed Forces of the United States.
(c) Permanent and total disablement for continuous period of six months.
(d) Layoff for four weeks or more.
(e) Death.

Partial payment of the company's contribution is payable on voluntary withdrawal.

Obviously such a plan could be costly to the company and could also provide significant security to workers in the event of layoff. Little is known of the number of participants in such plans, but in one example, the General Electric Savings and Security Program had 172,361 participants in 1966 and total assets of $383,404,608, almost two-thirds of which was in G.E. Common Stock.

4. Relation of Severance Pay to Pensions and Retirement. In some severance pay plans retirement is the only sufficient condition for severance pay (in some textile contracts) In about one-third of the plans studied in BLS in 1965, severance pay is not payable to workers eligible

for pensions.* Pension plans occasionally include severance pay provisions. In some plans workers may receive both severance pay and a pension and others provide a choice. A relatively common provision is that on those terminated workers who are ineligible for pension receive severance pay.

5. Are Severance Pay Funds Adequate? The very large severance payments possible under SUB plans may not in fact be paid after a mass layoff because the fund may be exhausted by payment of unemployment benefits to unemployed workers. The maximum fund level required to pay benefits in full in defense industries may far exceed the maxima of a few hundred dollars per covered worker that are common. Since the Federal government reimburses employer contributions to such funds in cost-plus-fixed fee contracts, the build up of sufficiently large SUB funds would incur large current expenditures to fund contingent liabilities. It would appear more efficient for the contracting authorities to approve the benefit schedule and there to guarantee payment of benefits, either by establishing a formal reinsurance system or by accepting the company's larger liability to the fund as a reimbursable expense. In insuring payment under standard SUB plans during periods of high defense expenditure the government would incur few expenses. With massive cutbacks, however, government costs would be large, but they would merely offset smaller defense expenditures.

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* For examples of these provisions see BLS, Severance Pay and Layoff Benefit Plans, pp. 27-30.

D. Effects of Cutbacks on Pension Funds.

In Chapter III we described and evaluated pension plans and pension funds in defense industries on the assumption that the firms would continue to exist, and their workforces to be employed, with about the same probabilities as civilian market firms and employees. The benefit levels, vesting, and provisions for voluntary early retirement are generally about the same in defense industry plans as in those of comparable civilian sector firms. Similarly, with few exceptions, defense industry pension plans are comparable to civilian sector plans in their funding methods and actuarial assumptions. However, defense industry pension funds did differ in that they have accumulated fewer assets per plan participant, but more assets relative to liabilities than their civilian sector counterparts. Nonetheless, if the defense firms were to continue to operate with stable employment indefinitely into the future, the overall assessment must be that their pension plans, funds and practices are adequate, and that they conform to prevailing practice.

Employment experience as well as long term expectations, however, are not the same in defense as in most civilian market industries. Employment for individual firms has been volatile, and significant disarmament would result in substantial and permanent workforce reduction. This section assesses the effects of a sharp, relatively large cutback in defense expenditures and industry employment on defense pension systems.

The workforce age and length of service characteristics are crucial data. Table V-6 is an estimate of these characteristics for the aircraft and parts industry, the largest single component of defense-oriented manufacturing employment. The estimates for the end of 1966 were made by applying the Boeing Company turnover rates to the employment reported in the 1950 and 1960 Census summaries, by age group and sex.*

The workers released by any reduction in aerospace employment (assuming that the aircraft and parts industry is a good proxy for aerospace) would be chiefly young men with little seniority. If the composition of the disemployed workers closely resembled that of total employment of the industry, more than half would have less than six

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* Further research in workforce adjustments to substantial disarmament should include an accurate survey of age, sex and length of service of the employees in the defense industries. Our estimates here are crude, sufficient only to suggest the approximate magnitudes.

Table V-6
Estimated Age and Length of Service, Workforce in
Aircraft and Parts Manufacturing, December 1966

	Length of Service:			
AGE	16 Years and over	10-15 Years	6-9 Years	Under 6 Years
20-25	0	0	1,000	*
26-30	0	1,000	10,000	*
31-35	1,000	5,000	25,000	*
36-40	1,000	15,000	32,000	*
41-50	18,000	42,000	63,000	*
51-60	22,000	38,000	34,000	*
61-65	11,000	13,000	5,000	*
65 and over	0	0	8,000	*
Total	53,000	114,000	178,000	465,000
Estimated Retired	18,000	10,000	0	0

* No data available.

Sources and method: The Boeing turnover rates for male hourly employees and female employees were applied to industry employment data, by age group, as reported in the 1950 Census (for column 1) and the 1960 Census. The latter calculations yield estimates of the number of persons with six or more years of service. The estimated number of persons with more than sixteen years of service were subtracted, and the remainder were prorated to the 10 to 15 years and 6 to 9 years length of service groups to reflect the increasing likelihood of longer service as age increases. Total industry employment in December 1966, reported by the U.S. B.L.S. was 810,000; subtracting the estimated number of long service employees yields 465,000, or short service employees of column 4.

years of service with the employer, and their median age would be in the middle thirties.* Only 15 per cent or so would be women.** It is clear that pensions as they are presently constituted could play only a small role as a workforce adjustment technique. The number of persons at or near normal retirement age is insignificant, no more than a few per cent of the industry workforce. Early retirement could be used, as discussed in the next section, if the existing plan provisions were modified or the benefits supplemented by government action. However, only about ten per cent of the workforce would meet even the most generous of plausible eligibility requirements: for example, minimum age 50 and ten or more years of service. To the extent that layoffs follow inverse seniority, the role of pensions would diminish even further.

The effects of a major arms cutback on the pension funds themselves and on the defense worker's pension rights are the final aspect of our evaluation. In brief, any significant reduction in defense expenditures and employment would result in the loss of accumulated pension rights by most of the disemployed and in substantial overfunding of the pension plans. The majority of the workers separated from employment would not have vested claims against the accumulated pension funds. In aerospace, for example, about 80 per cent of the workforce had less than the ten years of service required by most plans for vesting.*** The assets built up by employer contributions on behalf of almost all the workforce would remain in the plan funds, but liabilities would decrease with the layoff and separation from plan coverage of large numbers of unvested workers. If the workforce reduction were of substantial size, the resulting overfunding would not only reduce but perhaps eliminate future employer contributions; the pension claims of the remaining workforce would grow with increasing length of service, but could be met by the assets already at hand and future fund income. The potential benefits lost by the nonvested disemployed would be gained by the workforce retained. If the employment reduction resulted in plan terminations, assets would exceed liabilities, perhaps by wide margins.

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* The median age in the 1960 Census was 38 years. The very rapid expansion of industry employment in 1966--130,000 employees were added --almost certainly lowered the median.

** About 13 per cent of the 1950 employment, 16 per cent of 1960 and 15 per cent of January 1968 employment were females.

*** From Table V-6. Even this large proportion may be an underestimate. Unpublished results of a January 1966 survey of households, by David Landay of the U.S. Bureau of Labor Statistics, indicate that only 37 per cent of all men employed in manufacturing and between ages 50 and 64 had vested benefits. In transportation equipment manufacturing other than motor vehicles and parts, the proportion was higher, but still only 54 per cent. If the 1966 employment in aircraft and parts approximated the 1960 age and sex composition, our estimates would suggest that 75 per cent of the males in this age group had vested benefits.

Any reasonably precise estimate of the nature and degree of increased overfunding associated with sharp employment cutbacks would require a detailed actuarial analysis or audit of the various company plans.* The following rouge calculations, however, suggest the approximate magnitudes involved. Table V-7 summarizes the assumptions and results of the calculations. For each of the four identified length of service groups, the median age and length of service were estimated or assumed. The benefits payable at normal retirement for the age, length of service and assumed average earnings for each of the four groups were calculated, using the benefit formulas of nine aerospace plans for which we had full data. The benefits were weighted by the number of participants to yield a weighted average monthly benefit. The present value of the weighted average benefit, discounted at 4 per cent per year, was multiplied by the number of persons estimated to be in each length of service group to yield estimated liabilities.

The total liabilities, or claims against the industry's pension fund assets, calculated as above, amounted to approximately $1,809 million in December, 1966. The assets reported by the nine plans used to calculate average benefits were $762 million at the end of 1966, covering 251,400 workers. Assuming that the nine plans were representative, the total assets in all of the industry's pension plans would have been about $2,040 million (the assets per capita of the sample, multiplied by the estimated 680,000 workers with one or more years of service in December 1966). In view of the crudeness of both estimates, the discrepancy between liabilities and assets is not great.

To the extent that our estimates are approximately correct, about one third of the claims against the aerospace pension fund assets would not be vested in recent years or in the near future. (Industry employment increased by more than 20 per cent in 1966 and continued to grow, although more slowly, in 1967 and 1968. A large fraction of these new employees would become plan participants in 1967 and subsequent years, entering the pension plan normal cost calculations, but without vested benefit rights). These are the claims that would vanish with the substantial reductions in employment associated with an arms cutback.

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* This would be an appropriate objective of future research.

Table V-7
Estimated Pension Liabilities, by Length of Service Groups, All Plan Participants, Aircraft and Parts Manufacturing, as of December, 1966

	Length of Service:			
	1 to 5 Years	6 to 9 Years	10 to 15 Years	16 Years and Over
Median Age (estimated or assumed)	32	43	51	58
Mean Length of Service (assumed)	3	7	12	18
Weighted Average Monthly Benefit at Normal Retirement[a]	$17.50	$37.30	$64.10	$84.50
Present Value of Benefits (per person)[b]	$647	$2,125	$4,993	$8,700
Number of Persons[c]	300,000	178,000	124,000	71,000
Aggregate Claims (or fund liabilities) (millions)	$194.1	$378.3	$619.1	$617.7

a. Weighted average benefits of the nine aerospace plans for which we have full data and for which benefits could be calculated. Where wages or salaries were part of the benefit formula, the industry production worker average weekly earnings, as reported by the U.S. Bureau of Labor Statistics, were used for the hourly worker plans. For combined salary and hourly worker plans, the industry earnings were increased by 20 per cent; for plans covering only salaried employees, average eranings were assumed to be 60 per cent above the production worker average. The normal retirement age was assumed to be age 65.

b. Discounted at 4 per cent.

c. The calculations and data pertain to the end of 1966. The typical plan excludes employees with less than one year of service; this exclusion was approximated by using industry employment in January 1966--680,000 employees--as the base. The estimates of participants with more than ten years of service include retired workers.

E. Early Retirement and Workforce Adjustment.

The early retirement provisions now in force in almost all of the defense-oriented firms, as well as those of most of the civilian sector plans, are inadequate as workforce adjustment devices. First, almost all private pension plans were designed as supplements to the OASDI system, but OASDI benefits are not available until age 62. Second, actuarial reductions further shrink the already inadequate benefits. Finally, the act of early retirement itself cuts short the period over which contributions to retirement programs are accumulated, and upon which benefits in some plans are based. This further reduces the size of retirement benefits.

The benefit reductions to early retirees in all plans in our sample are significant, and in all but the most generous plans, automobile manufacturing and some larger aerospace firms, they appear to be punitive. In contrast to the rare fixed-contribution approach, most plans in our sample promise benefits based on length of service or some measure of the employee's average earnings. In principle, the benefit value of a year of service or earnings is independent of its position in the worker's career, or the funding period. A reasonable basis for benefit reduction would include only the effect of a longer period over which payments are to be made, appropriately reflecting mortality. The present value at age 65 of a lifetime stream of benefits based on a given length of service or earnings would yield a lifetime stream of smaller monthly benefits at age 60 or 55, but be paid over a longer period. Specifically, the present value, or purchase price of an annuity, of $1 per year for life at age 65 would buy an annual income at age 60 of about $.87, and at age 55, about $.77.* This an approximation to actuarial reduction, yields results similar to the best practice in aerospace and in the automobile industry (see Table V-8). The slightly more severe reductions reflect reduced mortality assumptions or a lower rate of interest.

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* The ratios of present values and purchase prices of immediate annuities offered by commercial insurers all yield approximately the same results. The present value at a given age of $1 income in some future year is the dollar multiplied by the probability of surviving to receive it, discounted at an appropriate rate. The present value of the lifetime income was calculated as the sum of the sum of the successive years' income, with survival probabilities taken from the 1951 general annuity table for males, with a one year setback, and discounted at 4 per cent.

Table V-8
Summary of Effects of Illustrative Early Retirement Benefit Reduction Formulas

Benefit Reduction Formula	Early Retirement Benefit as a Per Cent of Age 65 Benefit Retirement at Age: 60	55
1) Reduce by 2½% for each year before 65.	87½	75
2) * Actuarial reduction, reflecting only the longer payout period.	87	77
3) Reduce by 4% for each year before 65.	80	60
4) **Actuarial reduction, reflecting both the longer payout period and the curtailed funding period (and equal annual contributions per capita).	78	62
5) Reduce by 6½ per cent for each year before age 65.	67½	35

* These are only illustrative approximations; they do not appear in any plan in our sample. The actuarial reduction (2) is the median ratio of purchase prices of immediate annuities at ages 65 and 55, offered by seven large insurance companies. The source of annuity data was The Unique Manual and National Underwriter Life Reports, 1966 (Cincinnati: The National Underwriter Company, 1966), pp. 695-708. The companies selected were: Aetna, Equitable, John Hancock, Metropolitan, New York Life, Prudential and Travelers.

**The illustrative reduction (4) very roughly approximates the effect of individual level cost funding by calculating the ratio of the value of equal annual contributions to provide, for example, a given benefit at the end of 15 years and age 65 and the value of contributions over the first 15 years of a 25 year period to provide a benefit increased in proportion to the increased length of service at age 65. This ratio was then applied to the ratio of immediate annuity prices at ages 55 and 65. Similar calculations underlie the estimate for age 60. By ignoring mortality prior to age 55 or 60, this estimate overstates the

The most severe reductions include the effect of the shortened period of fund accumulation. Most funding methods provide for the value of fund accumulations to rise more than proportionately with respect to time, over the covered employee's career, whereas the benefits, in our sample's typical plan, increase at a constant proportion. As a consequence, the fund accumulated, for example, for twenty years of service, is smaller at age 55 than at age 65 for the same length of service. Many companies, defense and nondefense alike, reflect this attribute of the funding by further reducing the benefits to early retirees. The combined effects of actuarial reduction to spread the benefits over a longer payment period and of a curtailed funding period, using a rough estimate of individual level cost funding, shrinks benefits to less than 80 per cent and about 60 per cent, at ages 60 and 55 respectively, of the level payable at age 65 with identical service or earnings (line 4, Table V-8). Plans using an accrued benefit funding method would accumulate a good deal less over the early years and at younger ages. Applying such smaller accumulations to early retirement benefits yields the even more severe reductions of some plans. The results of the various reductions are monthly pensions of no more than $40 per month, under the most severe reduction formulas, to about $80 under the more lenient, for employees retiring with 20 to 25 years of service and average annual earnings in the $5400 to $7800 range.

Nonetheless, early retirement could serve as part of a workforce adjustment policy, if the benefit inadequacies were overcome. Precedents already exist. Both the automobile and steel industry basic plans include special provisions for early retirement, by mutual agreement, to ease withdrawal from the labor force of the older workers affected by plant shutdown or other permanent layoff. Both provide less stringent age and service minima for qualification, unreduced benefits (but based on actual service or earnings to the early retirement date), and a supplement to replace social security (see Table III-6). In the automobile plans, the minimum age is dropped to 55, with ten years of service requirement unchanged; the full normal benefit is supplemented monthly, until social security benefits are payable, by $5.20 multiplied by the years of service at the date of early retirement. The steel industry plan requires 20 years of service at age 55, but provides full normal benefits plus $75 per month until the retired worker is eligible for full social security benefits.

The provision of full benefits supplemented by the equivalent of

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cost a bit; by using relatively long periods of service and high interest rate, and especially equal annual contributions rather than accrued benefit, the estimate understates comparative costs.

social security would be costly if all workers were expected to retire early. The rough magnitudes are suggested in the following calculations. In every case, the basis for comparison is a worker retiring at age 65, with 25 years of service and $7800 average annual earnings. His pension benefits are assumed to be $150 per month, about the median for heavy industry (hourly and salary plans together). The approximate present value or cost of providing the lifetime monthly benefit stream at age 65 is about $20,000 (see Table V-9). To provide the same monthly benefit for life for a man at age 55 would require $26,000. The present value of a benefit equivalent to social security, for example, $130 per month for eight years would add another $10,500 to the sum required to be fully funded at early retirement.*

An exploration of normal costing of the various early retirement benefits is inappropriate in this study. As workforce adjustment devices, the benefits are assumed to be applicable only on a rare, crisis basis, and would require extraordinary financing. It is clear that the provision of full normal benefits and a social security supplement involves sums far larger than any employer would have accumulated on behalf of the workers involved. Where retirement income is based solely on length of service, the early retirement full benefit, including the supplement equivalent to social security, would require a present value double or more the amount likely to have been normally funded for the covered worker. If the benefits are increased to the level the early retiree would have earned, had he continued in service to the normal retirement date, the required present value or annuity cost, for a worker at age 55, would very likely be four or more times larger than the amount already accumulated on his behalf.**

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* The monthly benefit amount is near the maximum for a worker retiring in 1968, at age 55, and first claiming social security benefits at age 64 or 65. It reflects the low earnings maxima covered by social security for most of the recent past--$4200 and $4800 from 1951 to 1966. The eight year period was picked as a reasonable illustration. It carries the worker into the period in which he is eligible for social security benefits and it yields a present value near the amount for the full ten year period, reflecting mortality.

**A stream of equal annual contributions, at 4 per cent interest, assuming no mortality or turnover, at a rate just sufficient to provide a $150 monthly lifetime income at age 65 and at the end of 25 years, would have accumulated about $9,750 at the end of the first 15 years. This is only slightly less than one-fourth the $36,900 needed to provide the full normal 25-year benefit, plus supplement, at age 55. All actuarial methods would yield even lower funded amounts at the end of the fifteenth year.

Table V-9
Present Values of Annuities
(at varying rates of discount and mortality)
($150 per month for life)

	Age 65	Age 60	Age 55
1) Present value at 4% and 1951 GAT, male, one-year setback	$19,605		$25,965
2) Cost of an annuity due at 2-1/2% and U.S. life, 1949-51, white males	$19,665	$23,250	$26,955
3) Purchase price, immediate annuities, lowest of 7 major companies, 1966	$19,935	$23,055	$26,070
4) Purchase price, immediate annuities, median of 7 major companies, 1966	$20,250	$23,370	$26,400

Sources or method of calculation:

1) Calculated on an annual basis, payments assumed to be received at end of each year. First year payment assumed to be received with certainty and without discount.

3) and 4) Companies and source of data same as in Table V-8.

F. Provision of Full Benefits.

The costs of providing full benefits and social security equivalents for early retirees as a one-time adjustment in defense industries would be rather small relative to the pension reserves of the industries. If the minimum eligibility requirements are assumed to be age 55 and ten years of service, there would be few workers eligible for benefits. A rough and probably maximum estimate may be derived from Census data. Applying the Boeing Company turnover rates to the numbers of persons reported employed in the aircraft and parts industries in the 1960 Census, by age group and sex, yields, for early 1967, an estimated 87,000 workers with more than six years of service between ages 55 and 65. Assuming, very conservatively, that half the workers between 55 and 60 had ten or more years of service and that three-fourths of those over age 60 had ten or more yeras, the eligibles would number, at most, slightly less than 50,000. Extending the calculations to 1970 results in a net addition of about 18,000 persons. These figures are much more likely to be overestimates rather than understatements. The turnover rates used were the best available, but they reflect the experience of only one company whose size and relative isolation probably result in lower turnover than would obtain for the industry as a whole. More serious, the rates are for persons with two or more years of service, and thus exclude the highest turnover groups. Finally, the rates reflect only voluntary turnover; the effects of the involuntary workforce reductions that have occurred from time to time since 1960 almost certainly are significant.

At most, perhaps some 50,000 to 70,000 persons would be eligible for early retirement in the coming few years, with age 55 and 10 years of service requirements. The minimum estimate would reduce the figures perhaps by half--25,000 to 35,000. An instant fifty per cent reduction in the industry's workforce would result in layoff of at most half, and at minimum probably one-fourth of the age and length-of-service eligibles.* The prospective early retirees would be distributed over all the ten years between age 55 and 65, so the average costs of supplementing their pensions probably would amount to no more than $7,000 or $8.000. (The maximum would be about $15,000 or so for a long-service employee near age 55 to almost zero for those close to 65. The skewed age distribution would push the average up a bit, but the skewed length of service distribution would bring it down). The total cost would probably fall between $65 million and an unlikely maximum of about $280,000,000, with immediate full funding. Relative to the industry's pension fund assets, about $2 billion in 1966, both amounts are modest.

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* In Boeing's Dynasoar layoffs, persons age 55 and over with ten or more years of service were only 1-1/2 per cent of the total, whereas the company's prorata share of the industry's total number of persons in this age-service bracket, estimated by Boeing's turnover rates applied to the 1950 Census data, was very likely about 3 per cent.

The results of this preliminary analysis of early retirement as a defense industries' workforce adjustment device are paradoxical. For reasonable age and service minima, the provision of adequate benefits is relatively inexpensive because so few people are involved. But the involvement of only a small number means that early retirement contributes little to the massive workforce adjustment problems associated with substantial disarmament. Reducing the minimum age requirement to age 50 would add only about 20,000 more eligibles immediately, perhaps 40,000 more to the estimate for 1970. Applying the assumptions of the preceding paragraph, the numbers likely to be retired early would double, and the costs of their doing so would increase at least four-fold. Even with the reduced requirements, and $750 million to $1 billion in costs, the early retirements probably would account for no more than 15 per cent of the employees displaced by the posited fifty per cent reduction.

The supplementation of early retirement pensions from industry funds seems to be within the range of possibility, but such provision would be highly discriminatory. The actuarial gain to the fund arising from the layoff of workers below early retirement age would be devoted to providing above normal benefits for a fortunate group of displaced workers.* As an alternative disposition of the actuarial gain, however, this use might cause a noticeable withdrawal of workers from employment.

There does not seem to be an adequate way of providing full early retirement benefits from the plan's own resources without upsetting the equities of the plan. The writing of one-time legislation seems unfeasible. We conclude that the objectives of equity is best served by partial termination, and providing vested benefits for workers displaced in a large scale cutback. Admittedly this provides no cash to most workers. Firms have the option of distributing assets in cash. It is doubtful that many would choose to do so except for beneficiaries with small credits.

The desirability of providing a special government-financed early retirement supplement is examined in the next section.

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* The displaced workers could sue for partial termination to have their pension rights protected. Whether such a suit would succeed depends on the jurisdiction, for precedents conflict. It appears very unlikely that a company's defense that other terminated employees had received larger than expected benefits would serve to protect the fund from claims.

G. Is Federally Financed Early Retirement Desirable?

Retirement has frequently been proposed as one solution to the problem of high unemployment among older workers. The outstanding example of this was the strong support of old age pensions (titled "Old-Age Assistance" in the Social Security Act) and contributory pensions during the great depression. The idea of inducing older workers to withdraw from the labor force during a period of high general unemployment has its greatest appeal to those who believe that the economy is inherently incapable of providing a sufficient number of jobs for full employment except during infrequent periods of exhilaration arising from inflation or war. The need for this approach is generally rejected by most economists and businessmen.

One disadvantage of retirement is that the economy foregoes potential income. As a result, most students of the problems of the aging have rejected a general decrease in retirement age as a method of dealing with temporary excess unemployment. It is not only the foregone earnings that are important, but the fact that a very large proportion of aged people are already living in poverty, and reduction of the retirement age would, by lowering benefits actuarially, reduce living standards for such early retirees even more. Thus, early retirement might contribute to increased poverty unless pension schedules increased even more.

The potential problems arising out of more generous early retirement need to be recognized, but it should also be recognized that, as we found in Chapter IV, very few workers in good health choose to retire from the labor force voluntarily.

It can be concluded that measures to promote voluntary early retirement probably will not be broadly effective in removing workers from the labor force, even though they might induce some workers to leave temporarily or to leave their companies.

Since retirement at age 62 was adopted, the labor force participation rate of men 60-64 had decreased slightly.

A reduction of retirement age for OASDI because of high unemployment arising from readjustment would need to be identified as purely temporary. Even so it would establish a precedent that would contribute to reduction of the retirement age, and would therefore contribute to an increase in retirement cost.

A major objection to early retirement is its inefficiency. Making early retirement available only to displaced defense workers would be discriminatory. If made generally available, even temporarily, many workers who did not need to retire might choose to. Of course, they would presumably leave jobs available for other workers.

Retirement from a firm might or might not have the effect of leading the worker into withdrawing from the labor force. A significant number of older workers remain in the labor force after they draw an employer pension. Almost never does a private pension plan require total abstention from work as a condition of receiving the pension. Unless the pension is very large relative to previous earnings (which is unusual) it cannot be expected that many retirees will withdraw from the labor force. In OASDI, however, the existence of the work or retirement test is effective in limiting benefit receipt to those whose earnings are very small.

Thus early retirement through special provisions of OASDI might effectively limit benefits to those who are almost completely out of the labor force.

The unemployment effects of early retirement are of course related to the labor supply effects. The pensioners under the OASDI early retirement plan would reduce supply in the labor market except for the periodic seasonal or part-time employment permitted under OASDI. It seems likely, figuring pensioners will be in the labor market for about four months, that unemployment would be reduced by two for every three pensioners, assuming considerable excess supply of labor.

H. Legislative Protection of Pension Rights.

Since 1962 the desirability of additional Federal standards in private pensions has been widely discussed.* The legal rationale for action is clear: employer contributions to qualified pension plans are deductible for income tax purposes even though they are not taxable to the individual worker (who in most instances lacks an identifiable and severable right in the pension fund).** The purpose of this special tax treatment is to encourage employers to establish pension funds. In order for a plan to qualify it must meet certain standards. With respect to the employer, the pension trust must be: "for the exclusive benefit of the employees or their beneficiaries." It must be impossible for the employer to use or to divert the funds to his own use before the plan's liabilities are satisfied. It must be nondiscriminatory in that a larger percentage of regular employees must be eligible to participate and neither contributions nor benefits may discriminate in favor or officer, stock-holder, highly compensated, or supervisory employees.***

The only existing provisions for vesting were written into the Internal Revenue Code in Section 401 (a). The plan, as a condition of qualification must provide that "...upon its termination or upon complete discontinuance of contributions under the plan, the rights of all employees to benefits accrued to the date of such discontinuance, to the extent then funded, or the amounts credited to the employees' accounts, are nonforfeitable."

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* The impetus for this discussion arose from the Report of the Commission on Money and Credit and was taken up by President Kennedy in his charge to his Committee on Corporate Pension Funds and other Private Retirement and Welfare Programs. The Committee's Report Public Policy and Private Pension Programs, (Washington: U.S. Government Printing Office, 1965) recommended Federal standards for vesting and funding.

** The position that there is no subsidy to private pension plans, while supported by some people in the pension business, cannot be taken seriously. The taxes on the contributions and the earnings are deferred for many years and the value of the subsidy may be readily calculated for a particular plan.

*** For a discussion of tax treatment see Merton C. Bernstein, The Future of Private Pensions, New York: Free Press of Glencoe, 1964.

This provision provides no vesting protection for workers separated before formal termination of the plan. Formal termination does not appear to be common.* This problem is discussed in detail by Bernstein.**

A company with less than full vesting faced with a run down in employment may continue separating workers over a period of months, then, when the labor force has reached a suitably low level the company may terminate its plan, experiencing a substantial actuarial gain which may be recaptured by the company. Alternatively the company may merge or enter another activity, in which case the overfunded pension plan will provide prepaid pension benefits for a group of employees different from those originally covered. In the instance of a defense contractor, this means that plan assets resulting from Federal payments will not be used wholly for defense worker benefits.

The proposals to strengthen worker protection in pension plans treat three major problem areas:

(1) Lack of adequate care of funds.
(2) Inadequate funding.
(3) Inadequate vesting.

The protection of existing funds is aimed at in the proposed requirement of fiduciary standards in fund management. This is included in H.R. 5741 (an Administration bill) to amend the Welfare and Pension Plans Disclosure Act. The bill would add safeguards to the reporting act by establishing fiduciary standards of conduct, responsibility and obligation for all persons controlling employee welfare and pension benefit funds and by providing sanctions and providing for recovery of losses resulting from breach of the standards. From the hearings on this bill it is clear that there is considerable support for the bill, but some interested parties find the reporting of financial transactions provisions burdensome. In our examination of defense pension plans we have not found evidence that lack of fiduciary standards presents a major problem in providing security for the funds and we have not examined this problem in detail.

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* See, for instance, Emerson H. Beier, "Terminations of Pension Plans: 11 Years Experience," Monthly Labor Review, June, 1967; John M. Grogan, "An Actuarial Analysis of the Loss of Pension Benefits Through the Termination of Private Pension Plans," Old-Age Income Assurance, Vol. IV, Joint Economic Committee, 1967; and Joseph Krislov, "The Extent and Consequences of Pension Plan Terminations," Old-Age Income Assurance, Vol. IV, Joint Economic Committee, 1967.

**Op. cit.

The only funding requirement for qualified pension plans is aimed at preventing overfunding through excessive deductions,* and preventing discrimination in favor of prohibited employees. The IRS has issued rulings that have been, according to McGill, "...construed by some as imposing a minimum standard of funding as a condition for continued qualification under the tax laws. According to this interpretation, the aggregate contributions to a pension plan must be sufficient to meet the cost of currently /accruing/ benefits and to prevent an increase in any unfunded liability that may have existed at the inception of the plan." In other words, the contributions must be adequate to meet the normal costs of the plan plus interest on the initial past service liability, if any.**

McGill goes on to point out that the rulings are only doubtful protection, since, among other things, the IRS does not pass on the validity of the contributions and eventual funding of initial past service liability is not contemplated.***

Funding standards are proposed in the Pension Benefit Security Act of 1968 (S3421), a Department of Labor bill introduced by Senator Ralph Yarborough. Under this bill each subject plan would "provide for contributions to the plan in amounts necessary to meet an amount equal to the normal cost since inception of the plan plus interest on any unfunded past service costs." Existing plans must maintain the ratio of plan assets to vested liabilities at the present level for at most five years and thereafter increase the ratio by at least 3 percentage points per year. New plans must attain a funding ratio of 20 per cent. After five years new plans must increase the ratio by 4 percentage points a year. Reports are required on funding status every three years or when amended to liberalize vested benefits.

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* See for instance IRS, Regulations Section 1.404(a)-3.

** Dan M. McGill, Fulfilling Pension Expectations, (Homewood: Irwin, 1962), p. 211.

*** Op. cit. pp. 211-212.

If funding standards were not attained the employer (1) must make benefit rights nonforfeitable; (2) could not liberalize benefits; (3) would have to notify each employee of the effect of the deficit on his vested benefit, and (4) make additional reports. The Secretary of Labor could require a plan with a funding deficit to suspend further accumulation of vested liabilities or order termination of the plan.

The bill also provides an insurance plan for vested liabilities for plans meeting the funding standard.

The basic vesting standard provided in S-3421 is full vesting after 10 years of employment after age 25. Existing plans are allowed to (1) vest only benefits based on service after effective date of basic vesting standard, or (2) vest an increasing proportion of benefits for past and future service for any employee with 10 years service (first year - 10 per cent; tenth year - 100 per cent), or (3) vest benefits for past and future service, beginning in the first year for employees with 20 or more years of service reducing gradually to employees with 10 or more years of service after the tenth year.

New plans are permitted to (1) vest benefits for past and future service beginning in the sixth year of the plan's operation for employees with 15 or more years of service, reducing gradually to employees with 10 or more years of service after the tenth year of the plan's operation, or (2) vest an increasing proportion of benefits for past and future service, with 50% of the benefits for 10 years of service in the sixth year of the plan's operation and reaching 100% of benefits after the tenth year of the plan's operation.

The Secretary of Labor may require a certificate of approval for a plan's vesting provisions, and, thereafter, operation of a plan with such a certificate is unlawful.

I. Intervention on Behalf of Defense Workers.

We have considered the question of general standards for pension and other fringe benefits in the foregoing section, and found that there are substantial arguments supporting such provisions and considerable interest in legislation. The major political obstacle to the adoption of general standards is the fear that such standards would substantially increase the cost of such provisions and that this would impede the spread of pensions to firms that do not now have such provisions. It is primarily a matter of practicality.

In the question of defense contracts, of course, the problem is not so much one of practicality (as we will show) but of need for such provisions. It is shown above that there is a wide variation in the pensions provided by defense contractors, and that this of necessity introduces some question of cost differences. The contractor with small benefits is at a cost advantage relative to the contractor with generous programs, and, while it may be argued that cost is not always a major determining factor in the defense contracting decision, there is a question of equity raised.

The more common question, however, and this is particularly important in view of the non-cost character of many defense decisions, is whether defense contractors in general are claiming estimated pension costs in excess of the most probable or actual costs incurred under the contracts. Because of excessively conservative turnover assumptions the pension costs of many of the large contractors appear to be in excess of reasonable expectations. In response to this, the Defense Department has moved to limit contributions, but in some instances at least it seems clear that contractors will make much larger contributions to their pension funds than reasonable payments on behalf of defense contractors.

The difficulties of analysis in this area cannot be exaggerated, for it is true that there is no way to predict turnover and interest. Good commercial practice requires conservatism, and concern about the safety of pension funds also supports a tendency toward full funding of current accruals and rapid funding of past service benefits. It is possible, however, that a major arms cutback such as the one envisaged in this report, would leave some defense contractors with pension reserves far in excess of liabilities. In effect, mass displacements leave the fund with an actuarial gain because turnover is higher than expected.

Under existing regulations, pension contributions are a current cost, and once a year's costs have been approved by the Renegotiation Board there is no way that the costs can be recovered even if they far exceed actual costs. Thus, a company after laying off its defense employees may be left with a substantial prepaid expense for its nondefense employees. In effect, the Federal government will have paid for contributions to a fund for benefits on behalf of defense employees, but most displaced defense workers will never receive anything from the fund. The Federal government has incurred a cost which is not justified by the actual disposition of the funds.

This situation would not be remedied if the national standards for vesting were applied to defense industry (or all industry) because average age and tenure (so far as can be determined) is considerably lower in defense industry than elsewhere. In the examples that we have been able to examine, the vast majority of laid off employees had far less years of service than 10 years, which is the common vesting level in aircraft firms and is the legal minimum proposed in most of the pension legislation.

J. Legal Rationale of Intervention.

Examples of intervention by government in the employment process on behalf of particular groups of workers are numerous. It is generally recognized that in its role as an exemplary employer the United States government should provide exceptional services to its own displaced employees. Contractor employees are in a different situation, but it is accepted in law that the United States government has responsibilities and constitutional authority to specify conditions of employment, wages, and fringe benefits for employees. Although at present, the Federal government does not specify wages and fringe benefits for manufacturing workers, it does specify industry minimum wages. For construction workers it provides standard conditions of work, including wages and fringe benefits. The Federal government may specify for contractor employees, it has simply not provided the same degree of protection for manufacturing workers as for construction and service workers.

The general principle on which the legislation is based is that the Federal government should not be a party to substandard wages and conditions of employment.* The principal legislation is the Davis-Bacon Act of 1931 as Amended, the Walsh-Healey Act of 1936 as Amended and the Service Contract Act of 1965 (MOSCA). In addition the Federal government provides wage and hour standards in the Fair Labor Standards Act of as Amended (the Wage-Hour Law), and for its own employees various laws such as the Classification Act of 1949 as Amended.

The Davis-Bacon Act establishes prevailing wage standards including fringe benefits (added by 1964 amendments PL 88-349) for construction workers, the Walsh-Healey Act establishes prevailing minimum wages, and MOSCA establishes occupational minima and fringe benefits. The fringe benefit provision in MOSCA requires the Secretary to determine fringe benefits found "to be prevailing for such employees in the locality. Such fringe benefits shall include medical or hospital care, pensions or retirement or death, compensation for injuries or illness resulting from occupational activity, or insurance to provide any of the foregoing, unemployment benefits, life insurance, disability and sickness insurance, vacation and holiday pay, costs of apprenticeship or other similar programs and other bona fide fringe benefits not otherwise required by Federal, State, or local law to be provided by the contractor or subcontractor."

Clearly the weakest of these acts is the Walsh-Healey Act that applies to manufacturing. It establishes only a general minimum wage for an industry and does not specify prevailing standards for fringe benefits. It is apparent that manufacturing workers are much less well protected than either construction or service workers.

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* In the following discussion we have used the unpublished thesis of Stephen J. Newman, The Service Contract Act of 1965, (M.A. thesis on file in the Labor and Industrial Relations Library, University of Illinois), 1967.

The Comptroller General has stated that "...wage requirements cannot be stipulated in Government contracts in the absence of specific authority."*

Fringe benefits are explicitly ruled out of consideration in the Walsh-Healey Act by the Secretary. Determinations are based on hourly wage rates only on grounds that the Congress has explicitly opposed inclusion of such benefits as part of the employee's regular rate under FLSA for purposes covering overtime.**

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* Statement of Secretary of Labor Wirtz to U.S. Congress, Senate, Committee on Labor and Public Welfare, Service Contract Act of 1965 Hearings before Subcommittee on Labor, 89th Congress, 1st Session, on H.R. 10238, September 23, 1965 (Washington, D.C.: Government Printing Office, 1965), p. 11.

**See Federal Register, Jan. 31, 1962, p. 901 and Herbert C. Morton, Public Contracts and Private Wages: Experience under the Walsh-Healey Act, p. 62, fn 18.

The immediate legal instrument for providing such provisions in the instance of defense contractor employees is the Armed Services Procurement Regulation (ASPR). Conditions and requirements for contracts are set out in ASPR. Under the procurement system of the Department of Defense on which ASPR is the interpretative set of Federal Regulations it seems clear that the Federal government may provide any set of reasonable minimum or maximum standards. It is also clear that the Department of Defense has specified under ASPR a set of rules which, reasonably interpreted, would provide that adequate provision be made to protect pension rights of separated workers, or that the Federal government should disallow as sufficient amount of expense to employers that they would not benefit from the actuarial gain resulting from the excessive layoffs. This provision is discussed in the next section.

In effect, the contractor is not to benefit from reduction in force arising out of termination of his contract, but the government may negotiate a settlement. It is under this provision that the vesting arrangement is offered below. In effect, the Department of Defense can write into the contract the adjustment provision in lieu of formal cost provision.

The essence of the adjustment provision is that the total contribution to the pension plan during the contract be calculated and the present value of the benefits accruing from the service of the worker be taken into account at the time of termination of each employee.

In effect, the government will require either (a) that the employees benefits (less a normal turnover charge, as estimated in the employer's actuarial statement) be fully vested for the period in which his services are charged to government production; or (b) that only those actual costs accruing to workers from service under the contract will be allowable for reimbursement. Thus when each worker is terminated, he will have a deferred benefit.

The result of such action would be automatic administration of this paragraph of ASPR, which is not now the case. For the particular plan the company has in use, it should be possible to calculate the cost of the benefit he earns during his period of employment on the assumption that he continues to work under the contract, it is similarly possible to estimate the provisions made for cost under the contract. The purpose of this provision is to require the company either to provide the benefit for which the government was charged, or for these costs to be disallowed by the government.

It seems clear that the intent of ASPR 15-206 (f) Deferred Compensation is to limit allowability of contractor costs incurred to those arising out of production for government interest. In 15-206 (f)(3) it is specifically stated

> In determining the cost of deferred compensation allowable under the contract, appropriate adjustments shall be made for credits or gains, including those arising out of both normal and abnormal employee turnover, or any other contingencies that can result in a forfeiture by employees of such deferred compensation. Adjustments shall be made only for forfeitures which directly or indirectly inure to the benefit of the contractor; forfeitures which inure to the benefit of other employees covered by a deferred compensation plan with no reduction in the contractor's costs will not normally give rise to adjustment in contract costs. Adjustments for normal employee turnover shall be based on the contractor's experience and on foreseeable prospects, and shall be reflected in the amount of cost currently allowable. Such adjustments will be unnecessary to the extent that the contractor can demonstrate that his contributions take into account normal forfeitures. Adjustments for possible future abnormal forfeitures shall be effected according to the following rules:
>
> (i) abnormal forfeitures that are foreseeable and which can be currently evaluated with reasonable accuracy, by actuarial or other sound computation, shall be reflected by an adjustment of current costs otherwise allowable; and
>
> (ii) abnormal forfeitures, not within (i) above, may be made the subject of agreement between the Government and the contractor either as to an equitable adjustment or a method of determining such adjustment.

The interpretation of this paragraph is not obvious. For instance, the provision that "forfeitures inuring to the benefit of other employees" are allowable could be interpreted to mean that the government could not recover forfeitures to an underfunded plan with benefits certain and variable company contributions while it could recover forfeitures to a fully funded plan with benefits certain.

It is perhaps true that this provision of ASPR has not been enforced as strictly as it might be. For the purposes of facilitating adjustment, however, ASPR might well be amended specifically to provide that any actuarial gain arising from mass displacements shall be distributed to terminated workers, either in cash benefits or vested deferred benefits. In effect, ASPR could require partial termination of the pension plan to benefit displaced workers.

It can be argued that workers now have legal recourse to partial termination, but the courts have not upheld this doctrine except in a few cases.

A useful treatment of the partial termination question is given by Arthur S. Freeman in his testimony on 1963 revised IRS regulations. Freeman argues from Section 401 (a)(7) of the IRS Code that vesting is required on full termination of a plan but that the application of the same rule to partial termination goes beyond the intent of Congress in Section 401 (a)(7). As he says:

> Not only does the proposed regulation go beyond the new section, but it also goes beyond the prior utterances of the Commissioner on the subject of terminations; i.e., except in one of the rare instances noted above, terminations have not been considered to include partial terminations. Thus, there is no justification for contending that word "terminations" has by reason of long standing usage in the rulings and practice also come to mean "partial terminations" and that Congress, therefore, intended to include the latter as part of the former. Moreover, the definition of a partial liquidation as the exclusion from coverage of a "readily identifiable group of employees" is so broad and so vague that even if the statute had included partial terminations expressly, the use of this phrase would lead to many difficult problems of interpretation and inequities.*

Finding no tax decision precedents, Freeman cites Schnieder v. McKesson & Robbins, Inc. (CA-2 1958, Aff'g DC NY. 4) 254F.(2d)827) in which the court denied workers claim to partial termination benefits arising from closing discontinuance of some company divisions. The employees relied on Longhine v. Bilson, (Sup. Ct. Magara Co. 1936), 159 Misc. 111, 287 NYS 281 involving the closing of two plants and discharge of its work. This case is similar to Fernekes v. CMP Industries, Inc. (1961) 15 App. Div. (2d) 128, 22 NYS (2d)582, in which the sale of one of two divisions in the same plant was held to be "significant constriction of corporate activity".

Most of the decisions examined by Freeman followed the same pattern as McKesson, even where a substantial number of employees are discharged by reason of the sale or shut down. For example in George v. Haber (1955) 343 Mich. 219, former employees of Kaiser-Frazier brought suit against the trustees of a union negotiated qualified pension trust. In 1953, the company had closed down its Willow Run facilities, its principal place of business, and curtailed operations elsewhere in the state.

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* Employee Benefit Plan Review, Research Reports 119-15, 8-63. The following five paragraphs are based on Freeman's testimony.

The court refused to terminate the trust and distribute the proceeds, holding that the discontinuance of the plant was not such an alteration in circumstances as would warrant a termination of the trust and distribution of its contents in view of the express provisions of the contract to continue the fund.

In Bailey v. Rockwell Spring & Axle Co. (1958) 13 Misc. (2d) 29, 175 NYS (2d) 104, the company sold 1 out of 17 divisions with 108 out of a total of 1,704 employees and the court refused to treat the qualified non-contributing pension plan as terminated because one of 17 divisions had been sold.

Gorr v. Consolidated Foods Corp. (Minn. S. Ct. 1958) 91 N.W. (2d) 772, involved a group annuity contract. An action was brought by discharged employees claiming the policy was "discontinued" as to them with the consequent vesting of employer contributions for their benefit. The trial court found that there had been a discontinuance of the plan. On appeal, the reviewing court reversed, holding there had been no discontinuance under any of the provisions or stated contingencies of the contract. The court cited George v. Haber, supra, in support of its decision.

Further similar decisions holding no termination or partial termination occurred are Kracz v. Luther Mfg. Co. (1959), 338 Mass. 313, 155 N.E. (2d) 441, Local Lodge 2040, International Association of Machinists v. Servel, Inc. (CA-7 1959) 268 F. (2d) 692. Ct. Finnel v. Cramet, Inc., (CA-6 1961), 289 F. (2d) 409 and Pallace, et al. v. Broffman (1958) 139 N.Y.L.J., p. 4. Also see article "Employee Pension Rights When Plants Shut Down," 63 Harvard Law Review 952, 954, et. seq.

These cases show the extreme reluctance of the courts to terminate plans partially (except in New York State). The language of the agreement or trust indenture is usually binding and courts are naturally reluctant to disregard or to interpret broadly the language. These cases are not binding on the Internal Revenue Service. Vigorous enforcement of the partial termination rule and the establishment of guidelines for partial terminations could provide substantial protections for workers displaced en masse.

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VI. SUMMARY AND CONCLUSIONS

A. Summary.

In this study we have examined the role of pensions, severance pay and related benefits in facilitating adjustment by displaced defense workers. We did not intend to make policy recommendations, rather we hoped to lay out the policy alternatives and to marshal the available evidence bearing on the question. We assumed national policy objectives including high and rising national output, maximum employment, economic freedom, and intergroup equity. We also set out a framework for measuring the loss experienced by a displaced worker. We argued payment in compensation for losses arising from displacement to displaced workers is justifiable, that it is difficult to identify all the losers from displacement and their losses, and that some displaced workers will actually benefit economically from the displacement. Because pension rights and severance pay are related systematically to previous earnings and tenure, they are not necessarily related to the actual losses experienced by workers. They may not be an efficient way of compensating losses from displacement.

We also described benefit levels, vesting, and funding of defense firm pension plans. Our sample was selected to reflect the characteristics of industries that would be most affected by a particular arms cutback measure--a freeze on strategic nuclear delivery vehicle production. This cutback we found would chiefly affect aerospace industry in an identifiable way. In particular, a freeze effective in fiscal year 1969 would cause a cutback of about 343,000 workers in aerospace, most of this in missile production, including in this total 63,000 engineers. Massive cutbacks would be concentrated in the aerospace industry, and few other industries would suffer employment losses of a magnitude comparable to those of aerospace. The age and tenure characteristics of aerospace and other defense oriented industries differ considerably from manufacturing industry as a whole. Defense workers are younger and have shorter tenure, on the average, than all manufacturing workers. The age distributions of several groups of displaced workers are similar to or younger than the age distribution of the aircraft and parts industry. The data suggest that perhaps 10 to 15 per cent of the displaced defense workers would be 55 years and older. The tenure of workers in past major defense cutbacks vary widely, but because of the shifts in the composition of defense expenditure in the past decade it seems likely that less than one-third of the displaced workers would have as much as 10 years seniority with the company when they are displaced. The concentration of workers in the low tenure groups arises from the instability of employment in defense firms. Turnover in defense oriented industries is not high compared to other industries but firm employment is more unstable relative to industry employment in aerospace than in other industries. This means that, in a given period, aerospace industry turnover is concentrated in a few firms and arises from rather deep cuts in firm employment. These cuts lead periodically to the displacement of a substantial proportion of senior employees in aerospace firms.

Our analysis of pension plans in defense and non-defense firms shows, for an hourly worker in aerospace with 25 years of service and average annual earnings of $7,800, benefits ranging from $62.50 to $150.25 a month. A comparable worker in chemicals and ordnance would receive $178.75 a month, and in comparable noncontributory plans in non-defense industry he would receive from $86.50 to $168.75 a month. Thus benefits of defense workers appear to be comparable in amount to those in non-defense industry.

Vesting provisions of defense firms are, on the whole, somewhat more generous than in comparable non-defense firms, with 10 years a common pattern both in defense and in non-defense firms with attainment of a given age as a frequent additional condition. The vesting requirements of defense firms, while relatively generous, mean that relatively few defense workers have vested pensions because of the generally short tenure of defense workers. Thus comparing a given cutback in employment in a defense and a nondefense firm, a smaller proportion of the displaced defense workers might receive a vested benefit because of short tenure even though the defense firm had a more generous vesting provision.

The common pattern of early retirement provisions in aerospace is age 55 and 10 years of service. In electronics and in the non-defense industries age 60 was more common and longer periods of service were often required. Early retirement benefits are actuarially reduced in nearly all plans, except that a special layoff benefit is available in some automotive and heavy machinery firms.

Defense firm pension plans are more often fully funded or overfunded than are non-defense firm pension plans. Defense firm plans also usually have smaller proportions of retired members than do non-defense firm plans.

The experience of defense workers displaced in earlier cutbacks is considerably more favorable than that of displaced non-defense workers. Large proportions of defense workers have made the geographical relocations and have displayed the wage flexibility needed if large proportions of such workers are to be reemployed. With respect to wage flexibility, a significant proportion of each age group has accepted pay reductions of up to $50 a month, but most were able to find jobs paying as much or more than before displacement. The older workers received higher salaries somewhat less often and lower salaries somewhat more often than did younger workers. Many displaced defense workers have moved into nondefense industry in the past, but older workers have more often remained in defense industry. Displaced workers have also displayed considerable occupational mobility, with professional, managerial, and technical showing less than other groups, as might be expected.

Relatively few workers have withdrawn from the labor force after displacement. The common reluctance of older workers to retire is probably related largely to the low incomes that are all that most workers can expect to receive on retirement. Very few defense workers withdrew from the labor force after displacement, and this experience casts doubt on the rationality of a policy that would either attempt to induce retirement or assumes that such retirement will occur in very many cases.

The losses experienced because of unemployment of displaced defense workers show a regular increase with increasing age, from a median of $700 for the youngest group to $1,250 for those 55 years and older. This relationship arises primarily from the greater duration of unemployment among older workers and suggests that the total economic losses of older workers are somewhat greater than those of younger workers. These losses would no doubt be much larger for defense workers displaced as a result of a major arms cutback.

A special occupational group that is likely to experience major difficulties in the event of a major arms cutback are engineers. Many of the displaced defense engineers in past cutbacks have been able to find jobs in non-defense industry, but in no instance was there a general glut of engineers to impede the change. An arms cutback of the magnitude assumed accompanied by general offset measures is likely to release as many as 63,000 engineers, about twice as many as are annually added to the supply of graduate engineers. Since much of the demand for engineers in the 1950's and 1960's has been for military activities, the demand for engineers would probably be sharply reduced at the same time that the displaced engineers entered the labor market. The result might well be major unemployment and major economic losses among displaced engineers.

Supplemental unemployment benefits are payments made from a company-financed trust fund to laid-off employees or workers on short time in addition to Federal-State unemployment insurance. Such plans are most common in the automotive and steel industries, and relatively few defense oriented firms have such benefit plans. Benefits usually last up to 52 weeks and replace unemployment insurance payments when these are exhausted for workers with sufficient credit under the plan.

Severance pay is payment by the company to workers permanently terminated. Plans differ widely, with benefits ranging from a few weeks pay to one years pay or more. Severance pay is usually a lump-sum payment. The extended layoff benefits payable under many aerospace contracts provide a lump-sum Extended Layoff Benefit to workers laid off for a specified period. Such plans are similar both to SUB plans and severance pay. Separation benefits under SUB provide a termination payment related to period of service with a deduction for SUB payments received earlier by the worker. Such benefits can amount to a year's pay for a worker with 30 years seniority in the Douglas plan.

Large scale cutbacks in employment will leave pension plans with significant actuarial gains, which would serve as prepaid pension expenses if the firm continues operation, or might revert to the company if the firm terminated the plan long enough after the layoffs to avoid the requirement of vesting on termination. As a result of the vesting provisions of the plans, about one-third of aerospace pensions are not offset by vested benefits. These unvested claims would disappear if employment decreased and the plans were not terminated.

The early retirement provisions in most defense industry plans are inadequate as workforce adjustment devices because normal benefits are too small to support workers without an OASDI pension, and early retirement benefits are even smaller. For a worker with the maximum number of years of creditable service at age 55, the early retirement benefit would be from one-third to three-fourths of the normal benefit at age 65, depending on the actuarial reduction factors used in the particular plan. Most workers, of course, would have fewer creditable years of service at age 55 than they would have at age 65 so that the pension would be reduced even more. As a result, workers with 20 to 25 years of service and average annual earnings of $5,400 to $7,800 retiring at age 55, would receive a monthly pension ranging in amount from $40 to $80.

To provide an early retirement pension at age 55 equal to the $150 a month received by the average defense worker aged 65 with 25 years of service and $7,800 average annual earnings would cost about $26,000. To supplement this with $130 a month to bridge the gap between retirement and receipt of OASDI benefits would cost an additional $10,500. The total of $36,500 is about four times as much as would be accumulated for in a typical pension fund for such a worker.

The provision of full benefits would be relatively inexpensive as a proportion of the pension funds of firms in the aerospace industry, but correspondingly few people would be benefitted by such measures. Private provision of full early retirement benefits is possible, but does not seem likely.

The provision of Federal benefits for early retirement of displaced defense workers is another possibility. Such provisions would be as costly as those of private industry, but could presumably be paid through OASDI on a currently financed basis. The disadvantages of such provisions are their discriminatory character, their limited effectiveness in reducing the number of unemployed older workers, and the possible reduction in national output resulting from the reduction in the number of older workers at work.

Proposals for the legislative protection of pension rights that has been under discussion in the current session of Congress aim at establishing fiduciary standards of conduct of pension fund managers, specified levels of vesting, and specified levels of funding. None of the proposals is particularly relevant to the problems of defense industry pension funds, most of which presently exceed, meet, or come close to meeting the proposed vesting and funding standards. Thus there is little reason to expect general pension legislation will in any significant way improve the capacity of pension funds to facilitate adjustment by displaced defense workers.

Intervention on behalf of displaced defense workers in mass cutbacks appears to be possible through legislation. Congress has broad powers to define wage and fringe standards for government contractors, but these have been used sparingly on behalf of factory workers who lack the protection construction and service contract workers have won. Protection is also possible without additional legislation through Department of Defense administration of the Armed Services Procurement Regulation which establishes standards of allowability for deferred costs, including pension costs and Internal Revenue Service administration of code provisions relative to partial termination. Strictly administered these provisions would probably protect a substantial fraction of the unvested pension rights of many displaced defense workers. The recourse of workers to courts to force partial termination of pension plans have not generally been successful outside of New York State.

B. Conclusions.

As a consequence of these findings we conclude that, as presently constituted, the pension system is not well suited to provide adjustment benefits. At best, all the system can do is reduce the amount of loss suffered by displaced workers and this is done not by providing immediate cash benefits, but primarily by providing vested defined benefits. A major problem is that benefits are in no way related to the losses of workers. One practice in automotive and steel pensions of particular utility is the special layoff benefit which provides larger pensions for laid off workers eligible for early retirement than for workers choosing early retirement voluntarily.

Severance pay is commonly payable in large firms, sometimes in large amounts for long service workers. Like pensions, however, severance pay bears no close relationship to need. The component of the private benefit system is best suited to easing adjustment but it is not widely adopted within defense industry and this is supplemental unemployment benefit (SUB). The major advantage of SUB from the point of view of policy is that benefits are proportionate to the loss experienced by the worker during unemployment. The worker who is quickly reemployed receives only small SUB benefits while the worker with long unemployment receives more.

Under existing legislation defense employers in manufacturing probably cannot be required or even induced to provide SUB benefits. Legislation would be required to require companies to provide such benefits. Such a provision, while undoubtedly assisting in adjustment, would be a considerable departure from previous precedents in legislation.

Appropriate policy to be consistent with past legislative practice would concentrate on improving benefits under the Federal-State Unemployment Insurance system.

Our major conclusion, then, is that the private pension and benefit system is ill-suited to provide significant adjustment benefits. There is an opportunity to provide equitable protection in the form of accelerated vesting for the workers' pension rights, but this would probably not provide significant adjustment benefits. Legislation might be written that would require contractors to provide adequately funded adjustment benefits. Ultimately most of the cost of such benefits would place on the government as a cost of production either directly in cost reimbursable contracts or indirectly in other types of contract.

It seems clear then that provision of adjustment benefits must be pursued through improvement of the UI system. Without going into detail, we may briefly outline the direction such changes might take. The system may be changed by providing higher Federal taxation, most readily perhaps by increasing the tax base, and correspondingly higher benefit formulas. An alternative is to provide on a standby system a supplemental and extended system that would pay a larger proportion of previous earnings and pay them for a longer period of time when the national unemployment rate exceeded some specified level. The system might provide, for instance, a benefit of 50 per cent of average base year earnings for a maximum of six months when the unemployment rate was below 4 per cent for three consecutive months, 60 per cent and nine months when the rate was over 4 per cent for three consecutive months, and 75 per cent and one year when the rate was over 6 per cent for three consecutive months. This system is similar to that proposed by Galbraith.* Extended or temporary benefits have been provided under Federal legislation during the periods of high unemployment following the 1957 and 1960 recessions.

C. Suggestions for Further Research.

1. Data Gaps. Our analysis has been impeded by lack of published detailed data about age and tenure of defense employees. Few employers routinely collect such data, and the collection of such even from

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* John Kenneth Galbraith, The Affluent Society, Boston: Houghton-Mifflin, 1956.

cooperative employers would be a data processing job of considerable magnitude, but a precise characterization of defense workers subject to displacement would require such data. Defense firms in their own pension planning are severely hampered by lack of such data.

Our analysis was also impeded by the disadequacies of the Welfare and Pension Plan Reports file. While the librarians were cooperative, the files are difficult to use and far from complete. Some companies have apparently failed to file reports, and many companies file reports that provide little or no information and only conform pro forma with the provisions of the law.

These information gaps are likely to persist, at least until more complete reports are required by legislation.

2. Questions for Study. Defense workers as a group have not been adequately studied. The career patterns of defense workers are not fixed. A substantial fraction of all workers spend a few years in defense work, but for many of them this consists only of doing what they usually do but in this instance doing it for the benefit of the government. The patterns of industry turnover and presumably of worker mobility in defense industries suggests that many career defense workers may work for a number of different defense employers, but never spend long enough with any one employer. In effect, the Federal government has paid for pension fund contributions on behalf of these workers, but the worker never receives a pension. Information on the numbers of such workers is needed before the desirability of providing a special plan of career benefits can be judged. With respect to the effect of cutbacks on pension funds, our study necessarily required the making of crude assumptions, but we estimated that large cutbacks would result in large actuarial gains for pension funds. Detailed analysis of specific program cutbacks on specific companies, using their actual age and tenure is necessary before the conclusion can be firmly accepted.

The question of whether or not a defense pay premium esixts exists is still open. It may have considerable significance for post-cutback planning. If defense workers do receive a premium, as many suggest, the worker either may view it as compensation for a risky job (in which case he may show wage flexibility after being terminated) or build the premium into his expectations (and therefore make unreasonable demands after being terminated. The importance of wage rigidity in contributing to lengthy unemployment, is not known. Neither is it known how reservation wages change as the duration of unemployment lengthens. It would be useful to interview a sample of displaced workers several times through a period of two or more years after displacement. Until this is done it will not be possible to develop instruments to identify groups of workers who will have special difficulties. It is far too facile, for instance, to mark out older workers as a disadvantaged group, for it is clear that a substantial proportion of older workers do very well after displacement, and this is true of older workers in all education and occupation groups.

How critical are local labor market conditions to the adjustment process and what would be the effect of specified cutbacks on particular communities? A significant proportion of displaced defense workers are willing to relocate or actually do relocate, but most prefer to stay where they are. The capacity of defense areas to expand in response to reasonable defense-expenditure offsets varies widely. Areas with small expansion capacity or those in which the expanding activities would be unsuited to the capacities of the displaced workers need to be identified, and this identification would require a better understanding than we now have of the convertibility of defense workers to civilian activities that are likely to expand. The development or adaptation of benefit systems to facilitate necessary geographical relocation needs specific study.